ADDENDA

ANSI/ASHRAE/IES Addendum ap to
ANSI/ASHRAE/IES Standard 90.1-2019

Energy Standard for Buildings Except Low-Rise Residential Buildings

Approved by the ASHRAE Standards Committee on July 20, 2022; by the ASHRAE Board of Directors on August 15, 2022; by the Illuminating Engineering Society on September 8, 2022; and by the American National Standards Institute on September 9, 2022.

This addendum was approved by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. Instructions for how to submit a change can be found on the ASHRAE® website (https://www.ashrae.org/continuous-maintenance).

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a. interpretation of the contents of this Standard,
b. participation in the next review of the Standard,
c. offering constructive criticism for improving the Standard, or
d. permission to reprint portions of the Standard.

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

Addendum ap to Standard 90.1 includes the following:

- *A prescriptive requirement for a modest increase in efficiency above the stated requirements.*
- *Thirty-three (33) energy credit measures are included in a new Section 13 (Note: New Section 13 will be renumbered as Section 11, and current Sections 11 and 12 will be renumbered as Sections 12 and 13, respectively, when the standard is republished.)*
- *Requirements have been set for eight building use types in all climate zones. The requirements are based on achieving a cost-effective package of energy measures.*
- *The value of one credit is the reduction of total building energy cost by 0.1% based on national average energy prices used for Standard 90.1 analysis.*
- *Because different building use types have different energy cost indices that vary by climate zone, the same measure will have different total building cost savings impacts.*
- *The credits for different measures are based on simulation of building occupancy group prototypes for mainstream buildings with proration to other building use types based on Standard 90.1 progress indicator end-use analysis.*
- *Seven load management measures can also be used to achieve credits.*
- *Most of these load management measures also achieve energy savings. They prepare buildings to interact efficiently with the evolving electrical grid in the future.*

This is a new prescriptive requirement and additional costs are justified.

Energy Efficiency Credits

An energy credit working group in SSPC 90.1 identified and prioritized a broad range of measures and narrowed them to the following:

- *Envelope*
  - *E01: Use Appendix C for improvements in UA, SHGC, VT, air barrier leakage, and fenestration-to-wall ratio*
- *HVAC*
  - *H02: 5%–20% heating efficiency improvement*
  - *H03: 5%–20% cooling efficiency improvement*
  - *H04: Residential master HVAC control*
  - *H05: Ground-source heat pump*
  - *H06: DOAS/energy recovery ventilator with zone fan control*
  - *H07: Improved HVAC control sequences*
- *Service water heating*
  - *W01: Heat recovery service hot-water preheat*
  - *W02: Efficient heat-pump water heater*
  - *W03: Efficient gas water heater*
  - *Improved temperature maintenance*
    - *W04: Increase pipe insulation*
    - *W05: Point-of-use water heaters*
    - *W06: Thermostatic balancing valves*
  - *Multifamily and Hotel:*
    - *W07: Service hot-water submeters for dwelling units*
    - *W08: Right pipe sizing and reduced flow fixtures*
    - *W09: Shower drain-water heat recovery preheat*

- *P01: Added energy monitoring where not otherwise required*
- *Lighting*
  - *L02: Enhanced dimming and tuning*
  - *L03: More occupancy sensor control*
  - *L04: Increased daylight control area*
  - *L05: Residential master light control*
  - *L06: LPD reduction 5% to 10%*
- *Efficient equipment*
  - *Q01: Elevator efficiency*
  - *Q02: Kitchen equipment efficiency*
  - *Q03: Added fault detection where not otherwise required*

Load Management and Renewable Credits

Renewable energy replaces grid power with on-site generation. The load management credits relate to measures that shift energy use away from peak pricing periods and include the following:

- *R01: On-site renewable energy*
- *G01: Lighting response*
- *G02: HVAC response*
- *G03: Automated shading*
- *G04: Electric storage (battery bank)*
- *G05: Cooling (ice or chilled water) storage*
- *G06: Service hot-water thermal storage*
- *G07: Building mass with night flush controls*

The purpose of adding the load management credit options is to encourage reducing and shifting building load in conjunction with increasing building efficiency. Load shifting measures require installing communication controls and programming to automatically reduce electric energy use during high-demand periods. Thus, the load management credits take into account the time-sensitive value of efficiency and the ability to optimize energy use for grid services. These measures will future proof buildings so they can respond to changing grid needs and electrical pricing or system management over time.

The measure savings and corresponding credit values are based on electricity cost savings determined using the Standard 90.1 time-of-use rate (TOU), which was incorporated in the Standard 90.1-2022 work plan as an optional rate used to demonstrate the cost effectiveness of new code-change proposals involving demand flexibility measures. Utilization of this representative U.S. TOU rate, which results in similar annual electricity costs as the average national blended rate, is intended to serve as a proxy for valuing reduced grid impact, which accommodates increases in renewable electric generation, regional growth, and other grid changes impacting peak periods over time.

No load management credits are specifically required, and, along with renewable energy, these measuresare are limited to 40% of the required energy credits to meet the Section 13 requirements. While the focus of load management measures is shifting load away from high-price periods, the potential energy savings from load management is as follows:

- *G01: Lighting load management—always saves energy through load reduction during peak*
- *G02: HVAC load management—always saves energy through cooling or heating load reduction during the peak price period*
- *G03: Shading load management—always saves energy as cooling loads reduce*
- *G04: Electric storage (batteries)—results in an energy increase due to round trip losses; however, storage allows surplus renewable electric generation that might otherwise be wasted to be stored and used later. So in context of the grid as a whole, this can be a net energy saver.*
- *G05: Cooling storage—PNNL modeled ice storage, and there are some storage losses and impacts on cooling COP by using a low-temperature storage medium. This is offset by rejecting heat at night when it is cooler, improving chiller COP. For an ice system, energy is saved in 10 out of 19 climate zones, with energy losses in colder climate zones plus 0A and 0B.*

- *G06: SHW storage—there is energy loss due to larger SHW storage surface area or higher tank temperature. In addition to cost savings, this measure has potential similar to that of measure G05 to better use renewable generation.*
- *G07: Building mass/night flush—always saves energy where there is a cooling load through a combination of an intelligent night flush without mechanical precooling. Thermal mass savings was achieved in commercial buildings across all climate zones.*

Cost-Effective Package

The energy credit requirements are justified based on a selection of a package of measures that meet the requirement and are cost effective for each building use type and climate zone. About half the measures were selected for inclusion in the cost-effectiveness analysis based on their general applicability and reliable savings. More information on the development of the credit points and the cost effectiveness can be found in 90.1 Energy Credits Analysis Documentation: 90.1-2019 Addendum AP *at www.energycodes.gov/sites/default/files/2022-01/901-TSD_Energy-Credits_PNNL-32516.pdf.*

The measures selected for different building types are as follows:

Measures Included in a Demonstration Cost Effective Package

ID	Energy Credit Abbreviated Title	Measure Life, yr	Multifamily /Dormitory	Health Care	Hotel/Motel	Office	Restaurant	Retail	School/ Education	Warehouse/ Semiheated
E01	Glazing U & SHGC reduction	40	all CZ	all CZ	all CZ	all CZ	all CZ	CZ 0,3A,3C-4C	all CZ	
H02	Heating efficiency	18	15%, CZ 5A-8	15%, CZ 5A-8	10%, CZ 5B,6-8			10%, CZ 4-8		5%, CZ 5A-8
H03	Cooling efficiency.	15	10%, CZ 0-2A	15%, CZ 0-3B	10%, CZ 0-2	10% CZ 0-1	5%, CZ 0-3B	5%, CZ 0-2	10% CZ 0-2	5% CZ 0-1
H04	Residential HVAC control.	15	all CZ							
W02	Heat pump water heater	13		all CZ (30%)	all CZ (30%)					
W03	Efficient gas water heater	13		all CZ (70%)	all CZ (70%)		all CZ			
W05	Point of use water heaters	15				CZ 0B-5A			CZ 0-4	
L03	Increase occupancy sensor	15		CZ 0-6A	all CZ	all CZ		CZ 0B, 5B, 5C	all CZ	
L04	Increase daylighting area	15						CZ 0-5		CZ 0-5A 10%; 5B-8 5%
L05	Residential Light Control	15	all CZ							
L06	Light power reduction	20	all CZ, 5%	all CZ, 5%	all CZ, 10%	all CZ, 5%	all CZ, 10%	all CZ, 5%	all CZ, 5%	all CZ, 5%
R01	On-site renewable (0.1 W/ft²)	25	all CZ	all CZ	all CZ	all CZ	all CZ	all CZ	all CZ	all CZ
Q02	Efficient kitchen equipment	15					all CZ			
Q03	Fault detection	15		all CZ				all CZ		
G02	HVAC Load Management	15				all CZ				

[a] Dining areas and kitchens in dormitories, hotels, and schools treated as a separate area where efficient kitchen equipment credits apply

Based on this selection of measures, the scalar value or payback for each building type for the selected group of measures is shown below. This represents the cost for all measures included in the package divided by the annual energy cost savings.

	Climate Zone																		
Building Use Type	**0A**	**0B**	**1A**	**1B**	**2A**	**2B**	**3A**	**3B**	**3C**	**4A**	**4B**	**4C**	**5A**	**5B**	**5C**	**6A**	**6B**	**7**	**8**
Multifamily/Dormitory	6.8	7.4	8.2	7.9	9.0	11.2	13.2	11.6	13.3	12.2	10.6	14.1	10.1	10.4	14.7	8.7	9.8	9.0	7.8
Health Care	2.6	2.9	3.0	3.0	3.0	3.8	3.6	3.9	3.8	3.9	4.0	3.6	3.6	3.8	2.8	3.3	2.8	2.4	2.2
Hotel/Motel	3.2	3.6	4.0	3.9	4.4	5.0	5.6	5.5	5.2	5.7	5.2	5.9	5.9	5.8	6.1	5.3	5.6	4.9	4.4
Office	6.3	4.4	5.0	4.6	5.7	5.3	5.3	5.2	5.7	5.3	4.9	5.8	5.5	7.5	9.2	8.3	7.6	7.9	8.4
Restaurant	3.2	3.4	3.9	3.8	3.9	4.3	4.3	4.4	5.1	4.5	4.6	4.8	4.5	4.4	4.5	4.3	4.3	3.9	3.7
Retail Buildings	5.9	6.1	7.3	7.0	8.7	9.2	11.5	11.3	12.2	10.5	11.2	12.4	8.5	9.2	11.0	7.2	8.5	8.6	7.5
School/Education	3.7	4.0	4.7	4.3	5.0	5.4	6.2	5.7	6.0	6.0	5.4	6.5	8.3	7.4	8.6	7.7	7.7	7.8	8.1
Warehouse	10.5	10.4	10.8	10.6	9.8	9.0	10.1	8.9	9.3	10.9	9.1	11.1	9.0	9.0	11.9	7.4	8.2	7.8	8.6

The demonstration package that meets requirements is cost effective where the payback in the table above is less than a scalar threshold or discounted payback period that is determined based on measure life. The combination of individual measure lives is weighted based on savings, and in all cases the demonstration package that meets the requirement has a payback less than the discounted payback scalar threshold.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum ap to Standard 90.1-2019

Modify Section 3.2 as shown (I-P and SI).

[. . .]

high-end trim: process of setting the maximum light output of individual luminaires or groups of luminaires to support visual needs of a *space*, task, or area. *High-end trim* is also known as "institutional tuning" or "task tuning."

[. . .]

lumen maintenance: a lighting *control* strategy that increases light source power over time to maintain light levels as sources age, dirt accumulates in *luminaires*, or both. Also known as "lumen depreciation compensation" or "constant lumen output."

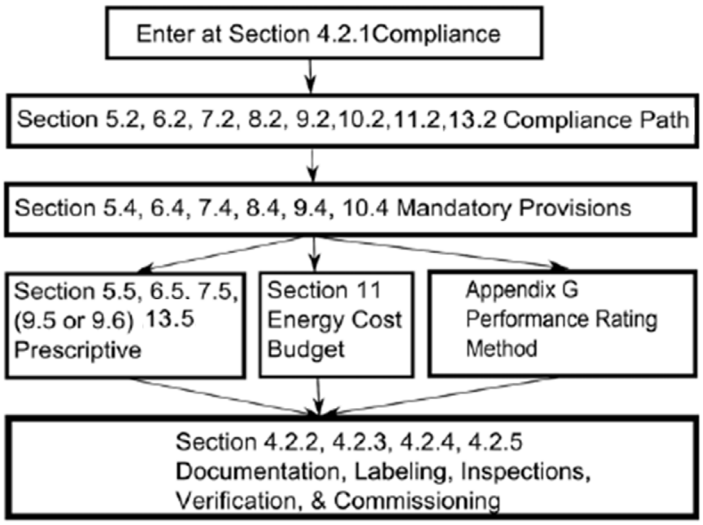
[. . .]

Modify Section 3.3 as shown (I-P and SI).

[. . .]

SHW service hot water

Replace Section 4 flow chart with the following image, and modify Section 4.2 as shown (I-P and SI).



4.2.1.1 New Buildings. New *buildings* shall comply with Sections 4.2.2 through 4.2.5 and either the provisions of

a. Section 5, "*Building Envelope*"; Section 6, "Heating, Ventilating, and Air Conditioning"; Section 7, "*Service Water Heating*"; Section 8, "Power"; Section 9, "Lighting"; ~~and~~ Section 10, "Other *Equipment*~~,~~"; and Section 13. "Additional *Efficiency* Requirements," or
b. Section 11, "*Energy Cost Budget* Method," or
c. Normative Appendix G, "*Performance Rating Method*."

[. . .]

4.2.1.2 Additions to Existing Buildings. *Additions* to *existing buildings* shall comply with the provisions of Sections 4.2.2 through 4.2.5 and one of the following:

a. Section 5, "*Building Envelope*"; Section 6, "Heating, Ventilating, and Air Conditioning"; Section 7, "*Service Water Heating*"; Section 8, "Power"; Section 9, "Lighting"; ~~and~~ Section 10, "Other *Equipment*~~,~~"; and Section 13. "Additional *Efficiency* Requirements," or
b. Section 11, "Energy Cost Budget Method," or
c. Normative Appendix G, "Performance Rating Method." in accordance with Section 4.2.1.1.

[. . .]

4.2.1.3 Alterations of Existing Buildings. *Alterations* of *existing buildings* shall comply with the provisions of Sections 4.2.2 through 4.2.5 and one of the following

a. Section 5, "*Building Envelope*"; Section 6, "Heating, Ventilating, and Air Conditioning"; Section 7, "*Service Water Heating*"; Section 8, "Power"; Section 9, "Lighting"; ~~and~~ Section 10, "Other *Equipment*~~,~~"; and Section 13. "Additional *Efficiency* Requirements," or
b. Section 11, "Energy Cost Budget Method," or
c. Normative Appendix G, "Performance Rating Method." in accordance with Section 4.2.1.1.

Exception to 4.2.1.3: A *building* that has been specifically designated as historically significant by the *adopting authority* or is listed in The National Register of *Historic* Places or has been determined to be eligible for listing by the U.S. Secretary of the Interior need not comply with these requirements.

[. . .]

4.2.2.3 Manuals. Operating and maintenance information shall be provided to the *building* owner. This information shall include, but not be limited to, the information specified in Sections 5.7.3.2, 6.7.3.2, 7.7.3.2, 8.7.3.2, 9.7.3.2, ~~and~~ 10.7.3.2, and 13.7.3.2.

Modify Section 9 as shown (I-P and SI).

9.9.1 Verification and Testing. Lighting *control devices* and control *systems* shall be tested in accordance with this section and Section 4.2.5.1 to verify that *control* hardware and software are calibrated, adjusted, programmed, and in proper working condition in accordance with the *construction documents* and *manufacturer*'s installation instructions. ~~When *occupancy sensors*, time switches, programmable schedule controls, or *photosensors* are installed, at a minimum, the~~ The following procedures shall be performed for the type of controls listed:

a. ~~Occupancy Sensors~~ *Occupancy Sensors*

[. . .]

b. *Automatic* Time Switches

[. . .]

c. Daylight Controls

[. . .]

d. *High-End Trim* and *Lumen Maintenance* Controls
   1. The initial maximum *set point* for power or light output for each control group of luminaires shall be documented.
   2. The tuned maximum *set point* for power or light output for each control group of luminaires shall be documented.
   3. Measurement of *high-end trim* in *daylight areas* shall be conducted at night.
   4. Where *lumen maintenance* controls are included, the *automatic* rate of increase in lighting power shall be no more than 1.0% per year.
   5. The *high-end trim* and *lumen maintenance* control documentation shall show the initial and tuned *set point* and area for each control group and summarize the overall percentage of lighting output or power reduction from tuning. The rate of increase for *lumen maintenance* shall be shown for each control group.

Modify Section 11 as shown (I-P and SI).

11.2 Compliance. The proposed *building* design shall comply with all of the following:

a. Sections 5.2.1, 6.2.1, 7.2.1, 8.2.1, 9.2.1, and 10.2.1.
b. ~~A~~ The *design energy cost* shall comply with the following:

$$Design\ energy\ cost \le Energy\ cost\ budget \times \left(1 - \frac{EC_{req}}{1000} \times A_{adj}\right)$$

where

EC_{req} = energy credits required for the *building* in accordance with Section 13.5.1

A_{adj} = where the project includes *additions* or *alterations* use an adjustment factor as follows; otherwise use 1.0:

$$A_{adj} = \frac{Addition\ gross\ floor\ area + Alteration\ gross\ floor\ area}{\text{Modeled } gross\ floor\ area}$$

Design energy cost=as calculated in Section 11.5

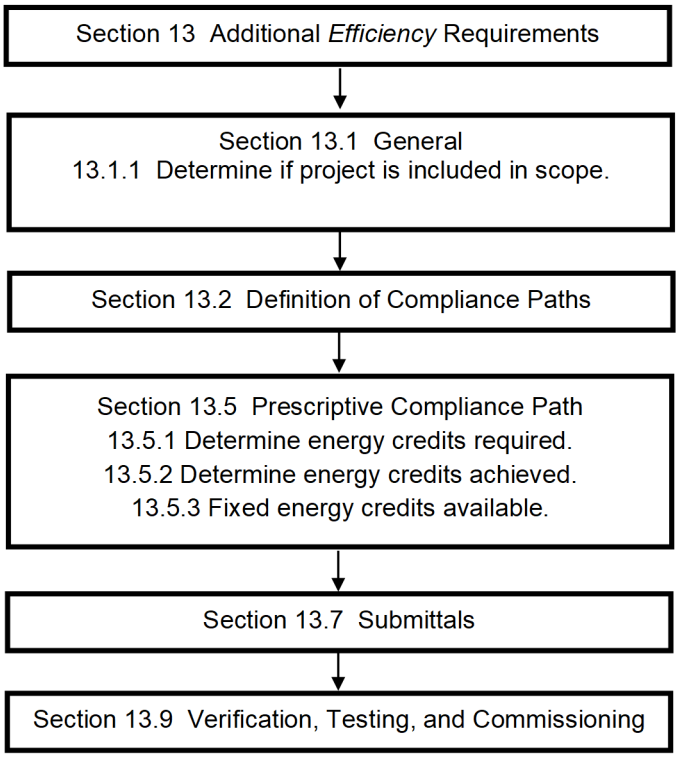
Energy cost budget~~,~~=as calculated in Section 11.5

~~, that does not exceed the *energy cost budget* as calculated by the *simulation program* described in Section 11.4~~

Modify Section 12 as shown (I-P and SI).

Reference	Title
[. . .]	
ASTM International **100 Barr Harbor Drive, P.O. Box C700, West Conshohocken PA 19428-2959**	
ASTM F1361-17	Standard Test Method for Performance of Open Deep Fat Fryers
ASTM F1484-18	Standard Test Method for Performance of Steam Cookers
ASTM F1495-14a	Standard Specification for Combination Oven Electric or Gas Fired
ASTM F1496-13	Standard Test Method for Performance of Convection Ovens
ASTM F1696-18	Standard Test Method for Energy Performance of Stationary-Rack, Door-Type Commercial Dishwashing Machines
ASTM F1920-15	Standard Test Method for Performance of Rack Conveyor Commercial Dishwashing Machines
ASTM F2093-18	Standard Test Method for Performance of Rack Ovens
ASTM F2144-17	Standard Test Method for Performance of Large Open Vat Fryers
ASTM F2861-17	Standard Test Method for Enhanced Performance of Combination Oven in Various Modes
[. . .]	
International Association of Plumbing and Mechanical Officials (IAPMO) **4755 E. Philadelphia Street, Ontario, CA 91761-2816**	
IAPMO/ANSI WE·Stand-2017	Water Efficiency and Sanitation Standard for the Built Environment
[. . .]	

Add new Section 13 as shown (I-P and SI). (Note: Once incorporated into the standard, this new section will be renumbered as Section 11, and existing Sections 11 and 12 will be renumbered as Sections 12 and 13, respectively.)



13. ADDITIONAL EFFICIENCY REQUIREMENTS

13.1 General

13.1.1 Scope. This section applies only to the *building envelope*, *equipment*, and *systems* installed in projects that include new buildings, additions, and alterations as described in Sections 13.1.2 through 13.1.4.

13.1.2 New Buildings. The *building envelope*, *equipment*, and *systems* in new *buildings* exceeding 2000 ft^2 (190 m^2) of *gross floor area* shall comply with the requirements of Section 13.2.

13.1.3 Additions to Existing Buildings. The *building envelope*, *equipment*, and *systems* in *additions* to *existing buildings* exceeding 2000 ft^2 (190 m^2) of *gross conditioned floor area* shall comply with the requirements of Section 13.2.

13.1.4 Alterations to Existing Buildings

13.1.4.1 Substantial Alterations to Existing Buildings. The *building envelope*, *equipment*, and *systems* in *alterations* of an existing building, other than additions, exceeding 5000 ft^2 (460 m^2) of *gross conditioned floor area* shall comply with the requirements of Section 13.2 where the *alteration* includes replacement of two or more of the following:

a. *HVAC systems* that account for more than 50% of the capacity serving either the heating or cooling loads of the *alteration* area. This includes HVAC unitary *systems*, HVAC *terminal* units, or components of HVAC central heating or cooling *equipment*, not including *ductwork* or *piping*. HVAC *terminal* units, for the purposes of this section, can include VAV boxes, fan-coil units, VRF room units, or water-loop heat pumps.
b. Fifty percent (50%) or more of the *luminaires* in the *alteration* area
c. Twenty-five percent (25%) or more of the *building envelope* area of the *alteration* portion of the *building*, including new exterior cladding, *fenestration*, or insulation

Informative Note: Substantial alterations are intended to include a major renovation of part or all of an existing building that extends the life of the building and includes major replacement of at least two major building systems.

Table 13.5.1-1 Energy Credit Requirements by Building Use Type

Building Use Type [a]	Climate Zone																		
	0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
Multifamily [b]	50	50	50	50	50	50	46	50	50	48	50	46	50	50	49	50	50	50	50
Health care [c]	50	46	47	46	47	45	49	47	50	46	46	50	50	50	50	50	50	50	50
Hotel/motel	50	45	47	46	49	48	46	47	50	48	50	50	47	46	47	49	46	50	50
Office [d]	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Restaurant [e]	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Retail	50	50	50	50	50	50	50	50	50	50	50	50	49	50	47	48	45	42	46
Education [f]	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	46
Warehouse [g]	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Other [h]	39	36	37	37	35	34	30	32	33	28	32	30	29	31	30	29	30	29	29

a. All *building* use types include supporting functions such as corridors, break rooms, lobbies, restrooms, mechanical rooms, storage rooms, conference rooms, individual *equipment* and *computer rooms* with loads ≤10 *kW*, minor snack and beverage service without a commercial kitchen, and up to 10% of *gross floor area* of other *building* use types such as an office area less than 2000 ft^2 (190 m^2) in a non-office *building* use type.

b. "Multifamily" includes apartments, condominiums, dormitories, retirement living facilities, nontransient lodging, and *residential* portions of institutional care facilities, excluding prisons.

c. "Health Care" includes *buildings* within the scope of ASHRAE Standard 170 *ventilation* requirements that are dedicated to patient care, including related support areas of health care facilities, hospitals, nursing facilities, outpatient facilities, and surgery centers.

d. Office includes offices or clinics where medical, dental, psychotherapy, physical therapy or other services are provided that are not within the scope of ASHRAE Standard 170 *ventilation* requirements.

e. Restaurants with commercial kitchens and dining areas that are separate *buildings* or constructed under separate permits shall meet restaurant building use type requirements. Where restaurants are part of a larger building and are not seeking credit for either measure W01, W02, W03, or Q02, their area is permitted to be included with the larger *building* use type.

f. Education includes schools, lecture halls, gymnasiums, and libraries.

g. Warehouse that are *conditioned spaces,* including storage and distribution *building*s, refrigerated warehouses, and storage rental facilities.

h. All other *building*s, including any *building* use not covered in the eight listed *building* use types above and data centers using Standard 90.4, shall use the energy credits required and available for the "Other" category.

13.1.4.2 Initial Build-Out Construction. The *building envelope*, *equipment*, and *systems* in initial build-out *construction* exceeding 1000 ft^2 (93 m^2) of *gross floor area* in *buildings* where the *alteration* did not have final lighting or *HVAC systems* installed under a prior *building* permit shall comply with the requirements of Section 13.2.

13.1.5 Climate. Climate zones shall be determined in accordance with Section 5.1.4.

13.2 Compliance Paths. New *buildings*, *additions*, substantial *alterations* as described in Section 13.1.4.1, and initial build-out *construction* as described in Section 13.1.4.2, shall comply with Sections 13.2.1 and 13.2.2.

13.2.1 Requirements for All Compliance Paths. The project shall comply with Section 13.1, "General"; Section 13.5, "Prescriptive Compliance Path"; Section 13.7, "Submittals"; and Section 13.9, "Verification, Testing, and Commissioning."

13.2.2 Additional Requirements to Comply with Section 13 (Not used)

13.3 Simplified Building Compliance Path (Not used)

13.4 Mandatory Provisions (Not used)

13.5 Prescriptive Compliance Path. Projects described in Section 13.1.1 shall achieve the total energy credits required in Section 13.5.1. Energy credits achieved by measures included in the *building* are determined in Section 13.5.2.

Informative Note: The energy credit values in Tables 13.5.1-1 and 13.5.2-1 through 13.5.1-9 represent about 0.1% total building annual energy cost savings per point.

13.5.1 Energy Credits Required. Projects shall achieve the total of credits required in Table 13.5.1-1 based on the *building* use type and climate zone. Projects with multiple *building* use types, *unconditioned* or *semiheated buildings*, parking garages, projects using *on-site renewable energy*, *alterations*, and *buildings* with separate shell-and-core and initial build-out *construction* permits shall comply as follows:

a. Where a project contains multiple *building* use types or situations covered in items (b), (c), and (d) below, credits in Table 13.5.1-1 from each *building* use type shall be weighted by the *gross floor area* of

each *building* use type or situation to determine the weighted-average project energy credits that are required. Achieved credits from Section 13.5.2 shall be similarly weighted.

b. Where separate permits are used for *building* core/shell and initial build-out *construction,* the following shall apply:
   1. The *building* core and shell project shall achieve at least 50% of the *energy* credits required in Table 13.5.1-1 where the core and shell project includes a central *HVAC system* or *service water heating system* that includes chillers, boilers, *service water heating equipment*, or loop pumping systems with heat rejection. Otherwise, the *building* core and shell project shall achieve at least 33% of the *energy* credits required in Table 13.5.1-1. The *building* core and shell permit shall not be eligible for credits from measures involving nonpermanent services in future build-out areas, such as freeze protection and limited lighting.
   2. Initial build-out *construction*, as described in Section 13.1.4.2, shall be deemed to comply with this section where one of the following applies:
      i. Where the initial build-out project includes HVAC heating and cooling generation *equipment*, the energy credits achieved under the initial build-out project are not less than 50% of the credits required in Table 13.5.1-1.
      ii. Where the initial build-out project receives heating and cooling services from the core and shell building—excluding condenser loop water—the energy credits achieved under the initial build-out project are not less than 25% of the credits required in Table 13.5.1-1.
      iii. The energy credits achieved under the initial build-out project, plus the energy credits achieved under a prior core and shell permit—not including core and shell credits from measures L02, L03, L04, L05, L06, G01, or G02—total at least the credits required in Table 13.5.1-1.

c. Substantial *alterations*, as described in Section 13.1.4.1, that are not initial build-out *construction* shall achieve 50% of the credits required for the *building* use type in the substantial *alteration* portion of the building.

d. *Unconditioned spaces*, *semiheated spaces*, and parking garages shall achieve 50% of the credits required for the "Other" *building* use type in Table 13.5.1-1.

e. Where *roof* space or insolation available for *on-site renewable energy* is limited according to the definition of RA_{net} in Equation 13-1, the energy credit requirement in Table 13.5.1-1 shall be adjusted and EC_{adj} used in place of EC_{req}, where EC_{adj} is determined using one of the following:
   1. Where the project meets any exception to Section 10.5.1.1, the PV_{adj} credits shall be subtracted from the credits required for the climate zone to find EC_{adj}.
   2. Otherwise, energy credits adjusted for *renewable energy resource* availability shall be determined as follows:

$$EC_{adj} = EC_{req} - PV_{adj} \times \left(1 - \frac{RA_{net}}{G_{floor} \times PV_{incl} \times 0.20}\right) \quad \text{(I-P)}$$

$$EC_{adj} = EC_{req} - PV_{adj} \times \left(1 - \frac{RA_{net}}{G_{floor} \times PV_{incl} \times 0.018}\right) \quad \text{(SI)}$$

where

EC_{adj} = adjusted energy credit requirement used instead of the energy credit requirement from Table 13.5.1-1

EC_{req} = energy credit requirement from Table 13.5.1-1

PV_{adj} = PV_{adj} for *building* type from Table 13.5.1-2

RA_{net} = horizontal projection of *roof* area available for *renewable energy resources* not covered by any combination of *equipment* other than for *on-site renewable energy systems*, planters, vegetated space, *skylights*, or occupied *roof* deck after meeting requirements of Section 10.5.1

G_{floor} = *gross floor area* of *building*, ft^2 (m^2)

PV_{incl} = PV_{incl} for *building* type from Table 13.5.1-2, W/ft^2 (W/m^2)

Exceptions to 13.5.1:

1. Portions of *buildings* devoted to manufacturing or industrial use not including office areas.
2. Where the core/shell complies in accordance with Normative Appendix G or Section 11, the initial build-out *alterations* do not need to achieve any energy credits.

Table 13.5.1-2 Renewable Adjustment Credits (I-P)

Building Use Type	PV_{adj} by Climate Zone																			PV_{incl}, W/ft$_2$
	0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8	
Multifamily	6	7	8	7	8	18	16	19	20	13	13	14	6	9	13	6	7	6	5	0.1
Health care	3	3	3	3	3	4	3	4	7	5	7	3	2	3	3	3	3	2	2	0.1
Hotel/motel	4	8	9	9	9	12	10	13	8	9	10	8	8	12	9	9	10	8	5	0.1
Office	6	6	7	7	12	8	8	9	10	7	9	7	6	8	7	6	7	6	5	0.1
Restaurant	1	1	1	1	1	2	1	2	2	1	2	1	1	1	1	1	1	1	1	0.1
Retail	5	5	6	6	7	8	14	17	16	7	14	12	10	14	12	10	12	10	7	0.1
Education	5	6	7	6	7	9	16	14	12	11	11	9	11	11	9	12	10	12	10	0.1
Warehouse	20	20	20	20	20	20	20	20	20	19	20	20	14	20	20	12	17	12	10	0.1
Other	6	6	7	7	7	8	7	9	9	7	9	7	5	8	7	6	7	5	4	0.1

Table 13.5.1-2 Renewable Adjustment Credits (SI)

Building Use Type	PV_{adj} by Climate Zone																			PV_{incl}, W/m^2
	0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8	
Multifamily	6	7	8	7	8	18	16	19	20	13	13	14	6	9	13	6	7	6	5	1.1
Health care	3	3	3	3	3	4	3	4	7	5	7	3	2	3	3	3	3	2	2	1.1
Hotel/motel	4	8	9	9	9	12	10	13	8	9	10	8	8	12	9	9	10	8	5	1.1
Office	6	6	7	7	12	8	8	9	10	7	9	7	6	8	7	6	7	6	5	1.1
Restaurant	1	1	1	1	1	2	1	2	2	1	2	1	1	1	1	1	1	1	1	1.1
Retail	5	5	6	6	7	8	14	17	16	7	14	12	10	14	12	10	12	10	7	1.1
Education	5	6	7	6	7	9	16	14	12	11	11	9	11	11	9	12	10	12	10	1.1
Warehouse	20	20	20	20	20	20	20	20	20	19	20	20	14	20	20	12	17	12	10	1.1
Other	6	6	7	7	7	8	7	9	9	7	9	7	5	8	7	6	7	5	4	1.1

Informative Notes:

1. Under Section 13.5.1(a), a building may be split into multiple building use types unless there is a small area less than 10% of the gross floor area of a different use type. Examples: A small managers office in a multifamily building, retail, or hotel would be included with the main multifamily or other use type, while a large administrative wing of a hospital (>10% of gross building area or greater than 2000 ft^2 [190 m^2]) would be a separate building use type. A coffee bar in the lobby of an office building or bookstore would be included with the office or retail use type, while a restaurant with a commercial kitchen in a hotel seeking hot water or kitchen equipment measures would be a separate building use type, regardless of relative size.

   Where office areas 2000 ft^2 (190 m^2) or more are associated with a larger building of a different type, such as a data center, warehouse, or hospital, the office area should be separated for energy credit treatment in the office building category, even if the special use was less than 10% of the total project building area.
2. The energy credit requirements in Table 13.5.1-1 are based on a cost-effectiveness analysis of a selection of credits that would typically be applied to each building use type. In all cases, photovoltaic renewable credits are included. The renewable credit adjustment in item (e) (based on Table 13.5.1-2) is included so that, where on-site renewable energy is not feasible, the required credits are appropriately reduced to match a typical cost-effective package of measures.

13.5.2 Energy Credits Achieved. Energy credits achieved for the project shall be the sum of measure energy credits for individual measures included in the project. Where a project contains multiple *building*

use types, credits achieved for each *building* use type shall be weighted by the gross floor area of each *building* use type group to determine the weighted-average project energy credits achieved. The combined renewable (R01) and load management (G01 through G07) energy credits achieved through Sections 13.5.2.6 and 13.5.2.8 shall be limited to meeting 60% of required energy credits. Credits are available for the measures listed in Sections 13.5.2.1 through 13.5.2.8. Base energy credits are shown in Tables 13.5.3-1 through 13.5.3-9 for *building* use types in each climate zone. Measure energy credits achieved shall be determined in one of three ways, depending on the measure:

a. The measure energy credit shall be the base energy credit for the measure, where no adjustment factor or formula is shown in the measure description (e.g., EC_{H02_base}).
b. The measure energy credit shall be the base energy credit for the measure, adjusted by a factor or formula as stated in the measure description in this section. Where adjustments are applied, each measure energy credit shall be rounded to the nearest whole number (e.g., EC_{H02_adj}).
c. The measure energy credit shall be by direct formula as stated in the measure description in this section, where each measure credit shall be rounded to the nearest whole number (e.g., EC_{H02_calc}).

Informative Note: The number of energy credits achieved for each individual measure is determined in one of three ways:

1. The base energy credit for the measure shown in Tables 13.5.3-1 through 13.5.3-9 for the building use type and climate zone where no adjustment factor or formula is shown in the measure description. This applies to the following measures:
   - H04: 13.5.2.2.4, “Residential Space HVAC Control”
   - H07: 13.5.2.2.7, “Improved HVAC Sequence of Operation”
   - W01: 13.5.2.3.1(a), “Heat Recovery for Service Hot-Water Preheating”
   - W05: 13.5.2.3.3(a), “Point-of-Use Water Heater”
   - W06: 13.5.2.3.3(b), “Thermostatic Balancing Valves”
   - W07: 13.5.2.3.4, “Dwelling-Unit Service Hot-Water Submeters”
   - W08: 13.5.2.3.5, “Right Sizing the Hot-Water Distribution System”
   - P01: 13.5.2.4, “Energy Monitoring”
   - L03: 13.5.2.5.3, “Occupancy Sensor Control Areas”
   - Q02: 13.5.2.7.2, “Efficient Kitchen Equipment”
   - Q03: 13.5.2.7.3, “Fault Detection and Diagnostics System”
   - G02: 13.5.2.8.2, “HVAC Load Management”
   - G03: 13.5.2.8.3, “Automated Shading Load Management”
   - G07: 13.5.2.8.7, “Building Thermal Mass”
2. The base credit for the measure shown in Tables 13.5.3-1 through 13.5.3-9 for the building use type and climate zone adjusted by proration factor or formula as stated in the measure description in this section. This applies to the following measures:
   - H02: 13.5.2.2.2, “HVAC Heating Performance Improvement”
   - H03: 13.5.2.2.3, “HVAC Cooling Performance Improvement”
   - H05: 13.5.2.2.5, “Ground-Source Heat-Pump System”
   - H06: 13.5.2.2.6, “Dedicated Outdoor Air System with Zone Fan Control”
   - W02: 13.5.2.3.1(b), “Heat Pump Water Heater”
   - W03: 13.5.2.3.1(c), “Efficient Gas Water Heater”
   - W04: 13.5.2.3.2, “Service Hot-Water Piping Insulation Increase”
   - W09:13.5.2.3.6, “Shower Drain Heat Recovery”
   - L02: 13.5.2.5.2, “Continuous Dimming and High-End Trim”
   - L04: 13.5.2.5.4, “Increased Daylighting Control Area”
   - L05: 13.5.2.5.5, “Lighting Control for Multifamily Buildings”
   - L06: 13.5.2.5.6, “Reduce Interior Lighting Power”
   - R01: 13.5.2.6, “On-site Renewable Energy”
   - Q01: 13.5.2.7.1, “Efficient Elevator Equipment”
   - G01: 13.5.2.8.1, “Lighting Load Management”
   - G04: 13.5.2.8.4, “Electric Energy Storage”

- G05: 13.5.2.8.5, “HVAC Cooling Energy Storage”
- G06: 13.5.2.8.6, “Service Hot-Water Thermal Storage”

3. By direct formula, as stated in the measure description in this section. This applies to the following measure:
   - E01: 13.5.2.1, “Improved Envelope Performance”

13.5.2.1 E01: Improved Envelope Performance. To achieve this credit, *building envelope* measures shall be installed to improve the *energy* performance of the project. Measure energy credits for improvement of the *building envelope energy* performance shall be determined based on the following:

$$EC_{E01\_calc} = 1000 \times \frac{EPF_{E01\_base} - EPF_{prop}}{EPF_{E01\_base}}$$

where

EC_{E01_calc} = energy credits achieved for improved envelope performance

EPF_{E01_base} = base *envelope performance factor* calculated in accordance with Normative Appendix C

EPF_{prop} = proposed *envelope performance factor* calculated in accordance Normative with Appendix C

13.5.2.2 Improved HVAC Performance. To achieve these credits, *equipment* shall provide HVAC performance improvement in accordance with Section 13.5.2.2.2, 13.5.2.2.3, 13.5.2.2.4, 13.5.2.2.5, or 13.5.2.2.6. *Equipment* shall also meet applicable requirements of Sections 6.4 and 6.5. Credits shall be as shown in Section 13.5.3 or as specified in each subsection for *building* use types where base credits are included in Section 13.5.3 tables. Use of multiple credits from this section shall be allowed.

13.5.2.2.1 H01: HVAC System Performance Improvement (Reserved)

13.5.2.2.2 H02: HVAC Heating Performance Improvement. To achieve this credit, *space* heating *equipment* shall exceed the minimum heating *efficiency* requirements by 5% or more than listed in the tables in Section 6.8.1. The measure energy credit for heating *efficiency* improvement (EC_{HE}) shall be determined as follows:

$$EC_{H02\_adj} = EC_{H02\_base} \times \frac{HEI}{5\%}$$

where

EC_{H02_adj} = energy credits achieved for heating *efficiency* improvement

EC_{H02_base} = H02 base energy credit from Section 13.5.3

HEI = lesser of the percentage improvement (as a fraction) above minimum heating *efficiency* requirements or 20% (0.20). Where heating *equipment* with different minimum efficiencies are included in the *building*, a heating capacity weighted-average improvement shall be used. Where *electric resistance* primary heating or reheat is included in the building, it shall be included in the weighted-average improvement with an EI_{heat} of 0. Supplemental gas and electric heat for heat-pump *systems* shall be excluded from the weighted EI_{heat}. For heat pumps rated at multiple ambient temperatures, use the *efficiency* at 47°F (8.3°C). Gas-fired *boiler systems* that are required to meet provisions of Section 6.5.4.8 shall use the minimum *system efficiency* as defined in Section 6.5.4.8.1. Gas-fired *boiler systems* that are required to meet provisions of Section 6.5.4.8 shall use the minimum *system efficiency* as defined in Section 6.5.4.8.1.

For metrics that increase as *efficiency* increases, EI_{heat} shall be calculated as follows:

$$EI_{heat} = \frac{HM_{des}}{HM_{min}} - 1$$

where

HM_{des} = design heating *efficiency* metric, part-load or annualized where available

HM_{min} = minimum required heating efficiency metric, part-load or annualized where available from Section 6.8.1 or Informative Appendix F, “U.S. Department of Energy Minimum Energy Efficiency Requirements, Test Procedures, and Definitions”

Informative Note: An example of an annualized or part-load heating efficiency is AFUE rather than E_t or E_c. Where only one efficiency rating is provided for equipment in Section 6.8.1 or Appendix F, use that metric.

13.5.2.2.3 H03: HVAC Cooling Performance Improvement. To achieve this credit, *space* cooling *equipment* shall exceed the minimum cooling *efficiency* requirements by 5% or more than listed in the tables in Section 6.8.1 or Appendix F. For water-cooled chiller plants, heat rejection *efficiency* shall also exceed the minimum *efficiency* listed in Table 6.8.1-7 by at least the percentage improvement in the chiller *efficiency*. The measure energy credit (EC_{CE}) for cooling *efficiency* improvement shall be determined as follows:

$$EC_{H03\_adj} = EC_{H03\_base} \times \frac{EI_{cool}}{0.05}$$

where

EC_{H03_adj} = energy credits achieved for cooling *efficiency* improvement

EC_{H03_base} = H03 base energy credits from Section 13.5.3

EI_{cool} = lesser of the percentage improvement (as a fraction) above minimum cooling *efficiency* requirements or 20% (0.20). Where cooling *equipment* with different minimum efficiencies are included in the *building*, a cooling capacity weighted-average improvement shall be used. Where multiple cooling performance requirements are provided, the *equipment* shall exceed the annualized *energy* or part-load requirement. Meeting both part-load and full-load *efficiencies* is not required.

For metrics that increase as *efficiency* increases, EI_{cool} shall be calculated as follows:

$$EI_{cool} = \frac{CM_{des}}{CM_{min}} - 1$$

For metrics that decrease as *efficiency* increases, EI_{cool} shall be calculated as follows:

$$EI_{cool} = \frac{CM_{min}}{CM_{des}} - 1$$

where

CM_{min} = minimum required cooling *efficiency* metric, part-load or annualized where available from Section 6.8 or Appendix F

CM_{des} = design cooling *efficiency* metric, part-load or annualized where available

For data centers using Standard 90.4, EI_{cool} shall be calculated as follows:

$$EI_{cool} = \frac{AMLC_{max}}{AMLC_{des}} - 1$$

where

$AMLC_{max}$ = maximum annualized mechanical load component from Standard 90.4, Table 6.5

$AMLC_{des}$ = as-designed annualized mechanical load component calculated in accordance with Standard 90.4, Section 6.5

Informative Note: An example of an annualized or part-load cooling efficiency is IEER rather than EER or COP, or IPLV kW/ton rather than FL kW/ton. Where only one efficiency rating is provided for equipment in Section 6.8.1 or Appendix F, use that metric.

13.5.2.2.4 H04: Residential Space HVAC Control. To achieve this credit, in *buildings* with *nontransient residential spaces*, *HVAC systems* serving *dwelling units* shall be *controlled* to *automatically* activate the *setback* condition with one of the following:

a. A main control by each *dwelling-unit* main entrance that initiates *setback* and non-*ventilation* mode for all HVAC units serving the dwelling unit and that is clearly identified as "Heating/Cooling Master Setback."
b. *Occupancy sensors* in each room of the *dwelling unit* combined with a *door* switch to initiate *setback* and non-*ventilation* mode for all HVAC units in the dwelling within 20 minutes of a *door* switch operation followed by all spaces being vacant. Where separate room HVAC units are used, individual *occupancy sensors* shall meet this requirement.

Table 13.5.2.2.5 GSHP Heat Rejection Adjustments

Climate Zones	HR_{adj} by Field Source Capacity		
	Full-Sized Bore Field with no Heat Rejection	90% Hours Source Size; Dry-Cooler Heat Rejection	90% hours Source Size; Evaporative Heat Rejection
0A, 1B, 2B, 3A, 3B, 4A, 4B	3.3		2.6
0B, 1A, 2A, 3C	7.6		5.3
4C, 5A, 5B, 5C	2.3		1.5
6A, 6B, 7, 8	1.4		1.1
All climate zones		1.0	

c. An advanced learning *thermostat* or controller that recognizes occupant presence and *automatically* creates a schedule for occupancy and provides a dynamic *setback* schedule based on when the spaces are generally unoccupied. Where *ventilation* is provided by a separate *system*, it shall also have *occupancy sensor control*.

13.5.2.2.5 H05: Ground-Source Heat-Pump System. To achieve this credit, a ground-source heat-pump *system* shall provide cooling and heating for at least 25% of the *gross conditioned building area*. The ground-source heat-pump systems shall include *building* ground-loop *HVAC systems* coupled with a closed-bore ground-heat exchanger, submerged heat exchanger using water-based fluid as a heat transfer medium, groundwater (well), or fluid infrastructure (such as effluent and wastewater), and shall comply with the following:

a. Loop *pump(s)* shall have controls and/or devices that will result in *pump* motor demand of no more than 30% of design wattage at 50% of design water flow and allow turndown to 15% flow. Alternatively, a separate field-loop *pump* shall be provided, with either a variable-speed *building pump* or individual pumps for each ground-source heat pump.

b. The geothermal-source exchanger shall be sized based on the heating and cooling loads served by the ground-source heat-pump *system* and shall comply with one of the following:

1. A closed bore field shall have at least 400 lineal feet (120 lineal metres) of bore *piping* per 12,000 Btu/h (3500 *kW*) of *system* cooling or heating capacity, whichever is greater. The *system* shall not include additional heat rejection or addition devices.

2. The ground source shall be sized such that the loop heat pumps provide 100% of the heating and cooling loads for at least 90% of both the cooling and heating *system* annual operating hours without requiring any supplemental heating or heat rejection from nonground sources, as demonstrated by an analysis approved by the *authority having jurisdiction*. Heat rejection shall include a two-speed or variable-speed fan.

The allowed credits are based on serving 25% of *gross conditioned building area* and including dry-cooler partial heat rejection. Adjust the base credits as follows:

$$EC_{H05\_adj} = EC_{H05\_base} \times \frac{Floor_{GSHP}}{0.25} \times HR_{adj}$$

where

EC_{H05_adj} = energy credits achieved for ground-source heat-pump system

EC_{H05_base} = H05 base energy credit from Section 13.5.3

$Floor_{GSHP}$ = fraction of whole-project *gross conditioned floor area* with heating and cooling provided by the ground-source heat *pump*.

HR_{adj} = heat-rejection adjustment factor by climate zone from Table 13.5.2.2.5

13.5.2.2.6 H06: Dedicated Outdoor Air System with Zone Fan Control. Credits for this measure are only allowed where single-zone HVAC units are not required to have multispeed or variable-speed fans in accordance with Section 6.5.3.2.1. HVAC controls and *ventilation systems* shall include all of the following:

a. Zone controls shall cycle the heating/cooling-unit fans off when not providing required heating and cooling or shall limit fan power to 0.12 W/cfm (0.25 W/L/s) of air delivered to the zone by the DOAS.

Table 13.5.2.2.6 DOAS Energy Recovery Adjustments

ERE_{adj} Based on Lower of Actual Heating or Cooling Energy Recovery Effectiveness where Required		
Cooling ERR Is ≥	**Heating *Enthalpy Recovery Ratio* (*ERR*) or *Sensible Energy Recovery Ratio* Is ≥**	**Energy Recovery Effectiveness Adjustment (ERE_{adj})**
65%	65%	1.00
60%	60%	0.67
55%	55% [a]	0.33
50%	50% [a]	0.25

a. In climate zones where heating recovery is required for this measure, for multifamily buildings heating energy recovery effectiveness below 60% is not allowed.

b. *Outdoor air* shall be supplied by an independent *ventilation system* designed to provide no more than 110% of the minimum *outdoor air* to each individual occupied *space* as specified by Standard 62.1

c. The *ventilation system* shall have *energy* recovery with an *enthalpy recovery ratio* (*ERR*) of 65% or more at heating *design conditions* in Climate Zones 3 through 8 and an *ERR* of 65% or more at cooling *design conditions* in Climate Zones 0, 1, 2, 3A, 3B, 4A, 4B, 5A, and 6A. In "A" climate zones, *energy* recovery shall include latent recovery. Where no humidification is provided, heating energy recovery effectiveness is permitted to be based on *sensible energy recovery ratio*. Where energy recovery effectiveness is less than the 65% required for full credit, adjust the credits from Section 13.5.3 by the factors in Table 13.5.2.2.6.

d. Where the *ventilation system* serves multiple zones, partial economizer cooling through an *outdoor air* bypass shall *automatic*ally *reset* the *energy* recovery leaving air temperature at 55°F (13°C) or 100% *outdoor air* bypass when a majority of zones require cooling and *outdoor air* temperature is below 70°F (21°C). Recovery-wheel speed control or other means are permitted to allow partial economizer cooling. Partial economizer cooling is not required in a latent recovery outside air dehumidification mode.

e. *Ventilation* systems providing mechanical dehumidification shall use recovered *energy* for *reheat* within the limits of item (d). This shall not limit the use of latent energy recovery for dehumidification.

Where only a portion of the *building* is served by constant-air-volume (CAV) units or the *ERR* or *sensible energy recovery ratio* is less than 65%, the base energy credit shown in Section 13.5.3 shall be prorated as follows:

$$EC_{H06\_adj} = EC_{H06\_base} \times Floor_{CAV} \times ERE_{adj}$$

where

EC_{H06_adj} = energy credits achieved for dedicated outdoor air system with zone fan control

EC_{H06_base} = H06 base energy credit from Section 13.5.3

$Floor_{CAV}$ = fraction of whole-project *gross conditioned floor area* where constant-air-volume single-speed fans are allowed and meet measure requirements

ERE_{adj} = energy recovery adjustment from Table 13.5.2.2.6 based on the lower of actual cooling or heating ERR or *sensible energy recovery ratio* where required for the climate zone

13.5.2.2.7 H07: Improved HVAC Sequence of Operations. To achieve this credit, all applicable control sequences shall be based on ASHRAE Guideline 36. Credits for this measure are only allowed where the *HVAC system* includes at least one of the following: a VAV air handler serving at least five (5) zone *terminals*, a chilled-water plant with at least two chillers, or a hot-water plant with at least two boilers or heat pumps.

13.5.2.3 Reduced Energy Use in Service Water Heating. Energy credits described in Sections 13.5.2.3.1 through 13.5.2.3.6 are available in any combination described in those sections for *building* use types where base credits are included in Section 13.5.3 tables.

13.5.2.3.1 Improved Service Water Heating Effectiveness. *Service water heating* effectiveness energy credits are permitted to be achieved in *building* use types where credits are available in Section 13.5.3 for one of the following:

a. **W01: Heat Recovery for Service Hot-Water Preheating.** To achieve this credit, the service water heating *system* shall have waste heat recovery from service hot water, heat recovery chillers, *building equipment*, or process *equipment* that is sized to provide not less than 30% of the annual hot-water requirements or sized to provide not less than 70% of the annual hot-water requirements if the *building* is required to comply with Section 7.5.3.

b. **W02: Heat-Pump *Water Heater*.** To achieve this credit, air-source heat-pump *water heater*s shall be installed according to the *manufacturer*'s instructions, and at least 30% of design end-use *service water heating* requirements shall be met using only heat-pump heating at an ambient condition of 67.5°F (19.7°C) db without supplemental *electric resistance* or *fossil fuel* heating. For a hybrid heat-pump water heater, the heat-pump-only capacity shall be deemed at 40% of first hour draw. Where the heat-pump-only capacity exceeds 50% of the design end-use load, excluding *recirculating system* losses, the credits from the Section 13.5.3 tables shall be prorated as follows:

$$\mathrm{EC}_{W02\_calc} = \mathrm{EC}_{W02\_base} \times \frac{\mathrm{Cap}_{HPWH}}{\mathrm{EndLoad} \times 0.5} \qquad \text{(not greater than 2)}$$

where

EC_{W02_calc} = energy credits achieved for heat-pump water heater

EC_{W02_base} = W02 base energy credit from Section 13.5.3

Cap_{HPWH} = heat pump only capacity at 50°F (10°C) entering air and 70°F (21°C) without supplemental electric resistance or fossil fuel heat, Btu/h or *kW*

EndLoad = end-use peak hot-water load, excluding load for heat trace or recirculation, Btu/h or *kW*

The heat-pump *service water heating system* shall comply with the following requirements:

1. For central *systems* with an installed total output capacity of more than 100,000 Btu/h (30 *kW*) at an ambient condition of 67.5°F (19.7°C) db, a preheat storage tank with ≥0.75 gal per 1000 Btu/h (≥9.7 L/*kW*) of design end-use *service water heating* requirements shall be heated only with heat-pump heating when the ambient temperature is >45°F (7.2°C).
2. For *systems* with *piping* temperature maintenance, either a *heat trace system* or a separate *water heater* in series for *recirculating system* and final heating shall be installed.
3. Heat-pump water heater efficiency shall meet or exceed one of the following:
   i. Output-capacity-weighted-average uniform energy factor (UEF) of 3.0 with a medium draw pattern in accordance with 10 CFR 430 Appendix E.
   ii. Output-capacity-weighted-average COP of not less than 4.0 tested at 50°F (10°C) entering air and 70°F (21°C) entering water in accordance with AHRI standard 1300.

   Informative Note: Service water heating system control settings and operating temperatures should be determined in accordance with the ASHRAE Standard 188 building water systems water management program for the building or with generally accepted engineering standards and guidance (e.g., ASHRAE Guideline 12).

c. **W03: Efficient Gas *Water Heater*.** To achieve this credit, the combined input-capacity-weighted-average *equipment* rating of all gas water heating *equipment* in the *building* shall be not less than 95% E_t or 0.93 UEF. *Buildings* required to comply with Section 7.5.3 shall receive 29.6% of the Section 13.5.3 W03 credit. *Buildings* where the installed service water heating capacity is less than 200,000 Btu/h (59 *kW*) and weighted UEF is not less than 0.82 shall achieve 25% of the base table W03 credit.

d. Combination *service water heating systems* shall achieve credits as follows:
   1. (W01 + W02) Where *service water heating* employs both energy recovery and heat-pump water heating, W01 is permitted to be combined with W02 and receive the sum of both credits.
   2. (W01 + W03) Where *service water heating* employs both energy recovery and efficient gas water heating, W01 is permitted to be combined with W03 and receive the sum of the W01 credit and the portion of the W03 credit based on item (4).
   3. (W02 + W03) Where *service water heating* employs both heat-pump water heating and efficient gas water heating, W02 is permitted to be combined with W03 and receive the sum of the W02 credit and the portion of the W03 credit based on item (4).
   4. For items (2) and (3), the portion of W03 credit shall be the Section 13.5.3 W03 credit multiplied by the share of total water heating installed capacity served by gas water heating with not less than 95% E_t or 0.93 UEF. In no case shall it exceed 60% of the W03 credit in Section 13.5.3. In *buildings* that have a *service water heating* design generating capacity greater than 900,000 Btu/h (260 *kW*), that proportioned W03 credit shall be further multiplied by 29.6%.

Table 13.5.2.3.5 Maximum Flow Rating for *Residential* Plumbing Fixtures with Heated Water

Plumbing *Fixture*	Maximum Flow Rate
Faucet for private lavatory,[a] hand sinks, or bar sinks	1.50 gpm at 60 psi (0.095 L/s at 410 kPa)
Faucet for *residential* kitchen sink[a, b, c]	1.8 gpm at 60 psi 0.11 L/s at 410 kPa)
Shower head (including hand-held shower spray)[a, b, d]	2.0 gpm at 80 psi (0.13 L/s at 550 kPa)

a. Shower heads, lavatory faucets, and kitchen faucets are subject to U.S. federal requirements listed in 10 CFR 430.32(o) through (p).
b. Maximum flow allowed is less than required by flow rates listed in U.S. 10 CFR 430.32(o) through (p) for shower heads and kitchen faucets.
c. A *residential* kitchen faucet is permitted to temporarily increase the flow above the maximum rate but not above 2.2 gal/min at 60 psi (0.14 L/s at 410 kPa) and must default to the maximum flow rate listed.
d. When a shower is served by multiple shower heads, the combined flow rate of all shower heads controlled by a single valve shall not exceed the maximum flow rate listed, or the shower shall be designed to allow only one shower head to operate at a time.

13.5.2.3.2 W04: Service Hot-Water Piping Insulation Increase. To achieve this credit, where service hot water is provided by a central water heating *system*, the hot-water pipe insulation thickness shall be at least 1.5 times the thickness required in Table 6.8.3-1. All service hot-water *piping* shall be insulated from the hot-water source to the *fixture* shutoff. Where no more than 50% of hot-water *piping* does not have increased insulation due to installation in partitions, the credit shall be prorated as a percentage of lineal feet (lineal metres) of *piping* with increased insulation.

13.5.2.3.3 Improved Service Hot-Water Temperature Maintenance. To achieve this credit, hot-water distribution temperature maintenance shall comply with one of the following:

a. **W05: Point-of-Use *Water Heater*.** Credits are available for office or school buildings larger than 10,000 ft^2 (930 m^2). Fixtures requiring hot water shall be supplied from a localized source of hot water with no *recirculating system* or *heat trace piping*. Supply *piping* from the *water heater* to the termination of the *fixture* supply pipe shall be insulated to the levels shown in Table 6.8.3-1 without exception. The volume from the *water heater* to the termination of the *fixture* supply pipe shall be limited as follows:
   1. *Nonresidential* lavatories: not more than 2 oz (60 mL)
   2. All other plumbing fixtures or appliances: not more than 0.25 gal (0.95 L)

   Exception to 13.5.2.3.3(a): Where all remotely located hot-water uses meet the requirements for measure W05, separate *water heater*s serving commercial kitchens or showers in locker rooms shall be permitted to have a local *recirculating system* or *heat trace piping*.
b. **W06: Thermostatic Balancing Valves.** Credits are available where *service water heating* is provided centrally and distributed throughout the *building*. Each *recirculating system* branch return connection to the main service hot-water supply *piping* shall have an *automatic* thermostatic balancing valve set to a minimal return water flow when the branch return temperature is greater than 125°F (52°C).

13.5.2.3.4 W07: Dwelling-Unit Service Hot-Water Submeters. To achieve this credit, each individual *dwelling unit* in a multifamily *building* served by a central *service water heating system* shall be provided with a service hot-water meter connected to a reporting *system* that provides individual *dwelling unit* reporting of actual domestic hot-water use. Recording of preheated water serving the cold water inlet to showers need not be metered.

13.5.2.3.5 W08: Right Sizing the Service Hot-Water Distribution System. To achieve this credit, where multifamily, dormitory, retirement, or hotel/motel buildings are served by a central service hot-water *system*, the *distribution system* serving *dwelling units* and guest rooms shall be sized using IAPMO/ANSI WE•Stand, Appendix C. Plumbing fixtures in *residential* spaces that are connected to the *service water heating system* shall have a flow or consumption rating less than or equal to the values shown in Table 13.5.2.3.5.

Informative Note: Where low water supply pressures are anticipated, user satisfaction may be enhanced if flow restrictors are specified to provide ≥80% of the rated flow at 20 psi (140 kPa). Where the distribution sizing protocol is applied to other than multifamily residential buildings, a variance to the plumbing code may be needed.

13.5.2.3.6 W09: Shower Drain Heat Recovery. To achieve this credit, cold water serving *building* showers shall be preheated by shower drain heat recovery units that comply with CSA B55.2. Potable water-side pressure loss shall be less than 10 psi (69 kPa) at maximum design flow. The *efficiency* of drain heat recovery units shall be 54% or greater measured in accordance with CSA B55.1. Full credits are applicable to the following *building* use types: health clinic, hospital, hotel, motel, multifamily, retirement facility, dormitory, and schools with more than eight showers. Partial credits are applicable to buildings where all but ground-floor showers are served, where the base energy credit is adjusted by the following factor:

$$EC_{W09\_adj} = EC_{W09\_base} \times \frac{\text{Showers with drain heat recovery}}{\text{Total showers in building}}$$

13.5.2.4 P01: Energy Monitoring. To achieve this credit, projects not required to have electrical *energy* monitoring systems installed in accordance with Section 8.4.3 shall be equipped to measure, monitor, record, and report *energy* consumption data in compliance with Section 8.4.3.

13.5.2.5 Lighting Efficiency Measures. To achieve these credits, interior lighting in the project shall meet measure requirements in accordance with Sections 13.5.2.5.2, 13.5.2.5.3, 13.5.2.5.4, 13.5.2.5.5, or 13.5.2.5.6. Credits shall be as shown in Section 13.5.3 or as specified in each subsection. Use of multiple credits from this section shall be allowed. Functional testing of lighting controls shall comply with Section 9.9.

Informative Note: Where lighting efficiency measures include reductions in lighting power, the lighting design should achieve ANSI/IES recommended practice for illuminance levels as referenced at www.ies.org/standards/lighting-library/the-interactive-illuminance-selector or in relevant IES recommended practice (RP) standards.

13.5.2.5.1 L01: Lighting System Performance Improvement (Reserved)

13.5.2.5.2 L02: Continuous Dimming and High-End Trim. To achieve this credit, *general lighting* in 75% or more of *gross lighted floor area* shall have luminaires configured for *continuous dimming* with the following:

a. *High-end trim* shall be implemented, and *construction documents* shall state that maximum light output or power of controlled lighting shall be initially reduced by at least 15% from full output. The average maximum light output or power of the controlled lighting shall be documented without *high-end trim* and with *high-end trim* in accordance with Section 9.9.1 to verify reduction of light output or power by at least 15% when tuned.
b. Where *lumen maintenance control* without lighting sensors is used, controls shall be configured to limit the initial maximum lumen output or maximum lighting power to 85% or less of full light output or full power draw.
c. *High-end trim* and *lumen maintenance controls* shall be accessible only to authorized personnel.
d. Where this credit is taken, the additional *interior lighting power allowance* in Section 9.6.3 related to dimming control is not permitted to be used. For hotel and multifamily *building* use types, the *gross lighted floor area* is for common areas not including *dwelling units* or guest rooms. Where *general lighting* in less than 75% but at least 50% of the *gross lighted floor area* receives *high-end trim*, the base credits from the tables in Section 13.5.3 shall be prorated as follows:

$$\frac{\text{\% Tuned area of } gross\ lighted\ floor\ area}{75\%} \times \text{Base energy credits for L02}$$

13.5.2.5.3 L03: Occupancy Sensor Control Areas. To achieve this credit, either *buildings* shall use Section 9.3, "Simplified Building Method Compliance Path," or in all *spaces* where *automatic* partial OFF (See Section 9.4.1.1[g]) or *automatic* full OFF (See Section 9.4.1.1[h]) is not required, it shall be installed as follows:

a. *Automatic* shutoff or light reduction shall occur within 15 minutes of all occupants leaving each control zone.
b. For spaces with multiple control zones or *automatic* partial OFF control, *automatic* full shutoff shall occur within 15 minutes of all occupants leaving the *space*.
c. For spaces with one control zone, *automatic* full OFF control shall be used.
d. All areas of the project with *automatic* partial OFF or *automatic full* OFF control shall have one *control device* for every 600 ft^2 (60 m^2) of *gross lighted area*.

Where this credit is taken, additional *interior lighting power allowance* in Section 9.6.3 related to *occupancy sensor control* shall not be used, and Exceptions to 9.4.1.1(g) shall not be used.

Exception to 13.5.2.5.3: Exception to *automatic* full OFF control requirement: stairwells.

13.5.2.5.4 L04: Increased Daylighting Control Area. To achieve this credit, the total *daylight area* of the project (DLA_{bldg}) with *continuous daylight dimming* meeting the requirements of Section 9.4.1.1(e) or 9.4.1.1(f) shall be at least 5% greater than the typical daylit area (DLA_{typ}). Where the actual *daylight area* includes additional daylit areas beyond the *primary sidelighted areas*, *secondary sidelighted areas*, *daylight area under skylights*, or *daylight area under roof monitor*, both of the following shall apply:

Table 13.5.2.5.4 Added Daylighting Parameters (I-P)

***Building* Use Type**	**DLA_{typ}**	**DLA_{max}**
Small office ≤5000 ft^2	10%	20%
Office >5000 ft^2	21%	31%
Single-floor retail ≤3000 ft^2 or retail with ≤1000 ft^2 *roof* area	0%	20%
Retail >3000 ft^2 of single-floor area	60%	80%
School	42%	52%
Warehouse and semiheated	50%	70%
Medical, hotel, multifamily, dormitory, and other	NA	NA

Table 13.5.2.5.4 Added Daylighting Parameters (SI)

***Building* Use Type**	**DLA_{typ}**	**DLA_{max}**
Small office ≤460 m^2	10%	20%
Office >460 m^2	21%	31%
Single-floor retail ≤280 m^2 or retail with ≤900 m^2 *roof* area	0%	20%
Retail >280 m^2 of single-floor area	60%	80%
School	42%	52%
Warehouse and semiheated	50%	70%
Medical, hotel, multifamily, dormitory, and other	NA	NA

a. An analysis based on IES LM83 shall be submitted demonstrating that the spatial daylight autonomy is at least 200, 60% for the additional actual *daylight area*.

b. Additional daylit areas shall be separately controlled by *automatic* daylighting controls.

Credits shall be determined based on the following:

$$EC_{L04\_adj} = EC_{L04\_base} \times 20 \times \left(\frac{DLA_{bldg}}{GLFA} - DLA_{typ}\right)$$

where

EC_{L04_adj} = energy credits achieved for increased daylighting control area

EC_{L04_base} = L04 base energy credit from Section 13.5.3

DLA_{bldg} = lesser of actual *daylight area* of the project with *continuous daylight dimming*, ft^2 or m^2, and (GLFA × DLA_{max}); see Table 13.5.2.5.4

GLFA = project *gross lighted floor area*, ft^2 or m^2

DLA_{typ} = typical % of *building* area with daylight control (as a fraction) from Table 13.5.2.5.4 or 0 where nonretail *buildings* use Section 9.3

Informative Note: In IES LM83, "spatial daylight autonomy" (sDA) means the amount of daylight received in a space over a portion of operating hours each year. It is written as sDA###,YY% where the ### indicates the desired lux provided by the daylight. YY% indicates the portion of operating hours per year to receive that daylight. It also includes an area requirement or statement. For example, "sDA200,60% for 30% of regularly occupied spaces" means that 30% of regularly occupied spaces receive at least 200 lux for at least 60% of the operating hours each year.

13.5.2.5.5 L05: Lighting Control for Multifamily Buildings

a. Common-area restrooms, laundry rooms, storage rooms, utility rooms, and garages shall have *automatic* full OFF control in accordance with Section 9.4.1.1(h).

b. Stairwells, lobbies, and corridors shall have *automatic* partial OFF in accordance with Section 9.4.1(g) controls that shall reduce *general lighting* power in the *space* by at least 66% of full lighting power within 15 minutes of all occupants leaving the *space*.

c. Each *dwelling unit* shall have a main control by the main entrance that turns off all the lights and all switched receptacles in the *dwelling unit*. Not less than two switched receptacles shall be provided in living and sleeping rooms or areas and clearly identified. All switched receptacles shall be located within 12 in. (30 cm) of an unswitched receptacle. The main control shall be permitted to have two controls, one for permanently wired lighting and one for switched receptacles. The main controls should be clearly identified as "lights master off" and "switched outlets master off". Alternatively, where all permanently wired lighting is controlled by *occupancy sensors*, only the switched outlets are required to be master switched.

Alternatively, stairwells are permitted to be excluded from item (b) and measure credits shall be one less than L05 base credits from Section 13.5.3

13.5.2.5.6 L06: Reduce Interior Lighting Power. To achieve this credit, the *installed interior lighting power*, less any additional lighting allowed from Section 9.5.2.2, shall be 95% or less than the *interior lighting power allowance,* less any additional lighting allowed in Section 9.5.2.2. In multifamily, dormitory, hotel, and motel buildings, the credit is calculated for common areas other than *dwelling units* and guest rooms. Energy credits shall not be greater than two times the L06 base credit from Section 13.5.3 and shall be determined as follows:

$$EC_{L06\_adj} = EC_{sim} + EC_{L06\_base} \times 20 \times \frac{LPA_{net} - LP_{net}}{LPA_{net}}$$

where

EC_{L06_adj} = energy credits achieved for lighting power reduction

EC_{sim} = EC_{L06_base} where *buildings* use Section 9.3, otherwise $EC_{sim} = 0$

EC_{L06_base} = L06 base energy credit from Section 13.5.3

LPA_{net} = net *interior lighting power allowance* calculated in accordance with the method used to meet the requirements of Section 9.2.3.1, W, excluding any additional interior lighting allowances in Section 9.5.2.2

LP_{net} = net *installed interior lighting power* calculated in accordance with Sections 9.1.3 and 9.14, W, excluding any additional interior lighting allowances in Section 9.5.2.2

13.5.2.6 R01: On-Site Renewable Energy. To achieve this credit, the total minimum ratings of *on-site renewable energy systems* in addition to the requirements of Section 10.5.1.1 shall be not less than 0.1 W/ft^2 (1.1 W/m^2) of *gross floor area*. Additional energy credits shall be determined as follows:

$$EC_{R01\_adj} = EC_{R01\_base} \times \frac{RR_{total} - RR_{req}}{0.1 \times PGFA}$$

where

EC_{R01_adj} = energy credits achieved for *on-site renewable energy*

EC_{R01_base} = R01 base energy credit from Section 13.5.3

RR_{total} = actual total minimum rating of *on-site renewable energy* systems, W

RR_{req} = minimum rating of *on-site renewable energy* systems required by Section 10.5.1.1 without exception, W

PGFA = project *gross floor area*

Informative Note: On-site renewable energy may include thermal service water heating or pool water heating in which case ratings in Btu/h can be converted to W, where W = Btu/h/3.413.

13.5.2.7 Equipment Efficiency Measures. Energy credits for *equipment efficiency* shall be determined in accordance with Sections 13.5.2.7.1, 13.5.2.7.2, and 13.5.2.7.3. Use of multiple credits from this section shall be allowed.

13.5.2.7.1 Q01: Efficient Elevator Equipment. To achieve this credit, qualifying elevators in the project shall be *energy efficiency* Class A per ISO 25745-2, Table 7. Elevators with regeneration capability shall have the means to absorb the regenerated electricity by other *building* loads or be able to export the *energy* to the utility grid. The electrical *system* shall not absorb regenerated electricity with *electric resistance* load banks. Base credits shall be adjusted based on qualified elevators in the *building* as follows:

Table 13.5.2.7.2-1 Minimum *Efficiency* Requirements: Commercial Fryers (I-P)

	Heavy-Load Cooking *Energy Efficiency*	Idle *Energy* Rate	Test Procedure
Standard open deep-fat gas fryers	≥50%	≤9000 Btu/h	ASTM Standard F1361-07
Standard open deep-fat electric fryers	≥83%	≤800 W	
Large-vat open deep-fat gas fryers	≥50%	≤12,000 Btu/h	ASTM Standard F2144-17
Large-vat open deep-fat electric fryers	≥80%	≤1100 W	

Table 13.5.2.7.2-1 Minimum *Efficiency* Requirements: Commercial Fryers (SI)

	Heavy-Load Cooking *Energy Efficiency*	Idle *Energy* Rate	Test Procedure
Standard open deep-fat gas fryers	≥50%	≤2600 W	ASTM Standard F1361-07
Standard open deep-fat electric fryers	≥83%	≤800 W	
Large-vat open deep-fat gas fryers	≥50%	≤3500 W	ASTM Standard F2144-17
Large-vat open deep-fat electric fryers	≥80%	≤1100 W	

$$EC_{Q01\_adj} = EC_{Q01\_base} \times \frac{F_A}{F_B}$$

where

EC_{Q01_adj} = energy credits achieved for efficient elevator equipment

EC_{Q01_base} = Q01 base energy credit from 13.5.3

F_A = sum of floors served by each Class A elevator

F_B = sum of floors served by all *building* elevators and escalators

Informative Note: For example, sum of floors is 10 where Elevator 1 serves five (5) floors, Elevator 2 serves three (3) floors, and an escalator serves two (2) floors: 5 + 3 + 2 = 10.

13.5.2.7.2 Q02: Efficient Kitchen Equipment. To achieve this credit, in projects or facilities that include a commercial kitchen with at least one gas or electric fryer, all fryers, dishwashers, steam cookers, and ovens shall comply with all of the following:

a. Achieve performance levels in accordance with the *equipment* specifications listed in Tables 13.5.2.6-1 through 13.5.2.6-4 when rated in accordance with the applicable test procedure.
b. Be installed prior to the issuance of the certificate of occupancy.
c. Have associated performance levels listed on the *construction documents* submitted for permitting.

Energy credits for efficient kitchen *equipment* shall be as stated in Section 13.5.3.

Informative Note: Where a commercial kitchen is included in a *building* where credits for efficient kitchen *equipment* are excluded, such as a cafeteria in an office *building*, treat the kitchen and dining area as a restaurant *building* use type following the weighted-average method in Section 13.5.1(a).

13.5.2.7.3 Q03: Fault Detection and Diagnostics System. To achieve this credit, where not otherwise required in Sections 6 through 10, a fault detection and diagnostics (FDD) *system* shall be installed to monitor the *HVAC system*'s performance and *automatically* identify faults. This installation is in addition to and more comprehensive than existing requirements in Section 6.4.3.12. The FDD *system* shall include all of the following:

a. Utilize sensors or devices to directly or indirectly monitor the *HVAC system*'s central plant *equipment*, zone *terminal equipment*, and associated mechanical components, including (but not limited to) motors, actuators, valves, and dampers. Control device positions or air and fluid flows shall be permitted to be estimated based on related sensed inputs.
b. Sample the sensors and devices at least once per 15 minutes.

Table 13.5.2.7.2-2 Minimum Efficiency *Requirements*: Commercial Steam Cookers (I-P)

Fuel Type	Pan Capacity	Cooking *Energy Efficiency*[a]	Idle Rate	Test Procedure
Electric steam	3-pan	≥50%	≤400 W	ASTM Standard F1484-18
	4-pan	≥50%	≤530 W	
	5-pan	≥50%	≤670 W	
	6-pan and larger	≥50%	≤800 W	
Gas steam	3-pan	≥38%	≤6250 Btu/h	
	4-pan	≥38%	≤8350 Btu/h	
	5-pan	≥38%	≤10,400 Btu/h	
	6-pan and larger	≥38%	≤12,500 Btu/h	

a. Cooking *energy efficiency* is based on heavy load (potato) cooking capacity.

Table 13.5.2.7.2-2 Minimum Efficiency *Requirements*: Commercial Steam Cookers (SI)

Fuel Type	Pan Capacity	Cooking *Energy Efficiency*[a]	Idle Rate	Test Procedure
Electric steam	3-pan	≥50%	≤400 W	ASTM Standard F1484-18
	4-pan	≥50%	≤530 W	
	5-pan	≥50%	≤670 W	
	6-pan and larger	≥50%	≤800 W	
Gas steam	3-pan	≥38%	≤1830 W	
	4-pan	≥38%	≤2450 W	
	5-pan	≥38%	≤3050 W	
	6-pan and larger	≥38%	≤3500 W	

a. Cooking *energy efficiency* is based on heavy load (potato) cooking capacity.

c. *Automatically* identify *HVAC system* faults using algorithmic-based analysis that performs rule-based, time-series trend-based, statistically based, or model-based diagnostics, including (where applicable) identification of, at a minimum, the following faults that affect energy performance:
   1. Simultaneous heating and cooling above an expected threshold or short-term cycling between heating and cooling
   2. *System* operation outside of scheduled hours above an expected threshold
   3. Air or fluid flows not modulating when designed to be variable
   4. Significant changes in *energy* use as a function of ambient or other conditions

d. *Automatically* provide authorized personnel with prioritized recommendations for fault *repair* of identified faults based on estimated excess *energy* consumption or cost of non-*repair.*

e. Be capable of transmitting the prioritized fault *repair* recommendations to remotely located authorized personnel.

The FDD system requirements of items (a) through (e) shall be allowed to be incorporated into a building management system (BMS) or building automation system (BAS). Where credit is also taken for H07, all of the applicable automatic fault detection and diagnostics (AFDD) specified in Guideline 36 shall be included in FDD reporting and all necessary AFDD sensors recommended by Guideline 36 for applicable *HVAC systems* shall be installed.

Informative Note: FDD is in addition to standard BAS/BMS monitoring and alarming functionality. Faults identified may also include failing or failed system components, poor air or fluid flow, inoperable valves and dampers, sensors and devices out of calibration, undermaintained equipment and filters, failing or failed bearings, or unresponsive actuators and devices.

Table 13.5.2.7.2-3 Minimum *Efficiency* Requirements: Commercial Dishwashers (I-P)

Machine Type	High-Temp *Efficiency* Requirements		Low-Temp *Efficiency* Requirements		Test Procedure
	Idle *Energy* Rate[a]	Water Consumption[b]	Idle *Energy* Rate[a]	Water Consumption[b]	
Under counter	≤0.50 *kW*	≤0.86 GPR	≤0.50 *kW*	≤1.19 GPR	ASTM Standard F1696-18 ASTM Standard F1920-15
Stationary single-tank door	≤0.70 *kW*	≤0.89 GPR	≤0.60 *kW*	≤1.18 GPR	
Pot, pan, and utensil	≤1.20 *kW*	≤0.58 GPR	≤1.00 *kW*	≤0.58 GPSF	
Single-tank conveyor	≤1.50 *kW*	≤0.70 GPR	≤1.50 *kW*	≤0.79 GPR	
Multiple-tank conveyor	≤2.25 *kW*	≤0.54 GPR	≤2.00 *kW*	≤0.54 GPR	
Single-tank flight type	Reported	GPH ≤ 2.975*x* + 55.00	Reported	GPH ≤ 2.975*x* + 55.00	
Multiple-tank flight type	Reported	GPH ≤ 4.96*x* + 17.00	Reported	GPH ≤ 4.96*x* + 17.00	

a. Idle results should be measured with the door closed and represent the total idle *energy* consumed by the machine including all tank heater(s) and controls. Internal or external booster heater *energy* consumption shall not be part of this measurement unless it cannot be separately monitored.
b. GPR = gallons per rack; GPSF = gallons per square foot of rack; GPH = gallons per hour; *x* = square feet of conveyor belt (i.e., width × length)/min (max conveyor speed).

Table 13.5.2.7.2-3 Minimum *Efficiency* Requirements: Commercial Dishwashers (SI)

Machine Type	High-Temp *Efficiency* Requirements		Low-Temp *Efficiency* Requirements		Test Procedure
	Idle *Energy* Rate[a]	Water Consumption[b]	Idle *Energy* Rate[a]	Water Consumption[b]	
Under counter	≤0.50 *kW*	≤3.3 LPR	≤0.50 *kW*	≤4.50 LPR	ASTM Standard F1696-18 ASTM Standard F1920-15
Stationary single-tank door	≤0.70 *kW*	≤3.4 LPR	≤0.60 *kW*	≤4.47 LPR	
Pot, pan, and utensil	≤1.20 *kW*	≤2.2 LPR	≤1.00 *kW*	≤0.20 LPSM	
Single-tank conveyor	≤1.50 *kW*	≤2.6 LPR	≤1.50 *kW*	≤3.0 LPR	
Multiple-tank conveyor	≤2.25 *kW*	≤2.0 LPR	≤2.00 *kW*	≤2.0 LPR	
Single-tank flight type	Reported	LPH ≤ 11.26*x* + 208.0	Reported	LPH ≤ 11.26*x* + 208.0	
Multiple-tank flight type	Reported	LPH ≤ 18.8*x* + 64.3	Reported	LPH ≤ 18.8*x* + 64.3	

a. Idle results should be measured with the door closed and represent the total idle *energy* consumed by the machine including all tank heater(s) and controls. Internal or external booster heater *energy* consumption shall not be part of this measurement unless it cannot be separately monitored.
b. LPR = litres per rack; LPSM = litres per square metre of rack; LPH = liters per hour; *x* = square metres of conveyor belt (i.e., width × length)/min (max conveyor speed).

13.5.2.8 Load Management Systems. Energy credits for load management measures in Sections 13.5.2.8.1 through 13.5.2.8.7 are available in any combination to projects in *buildings* that have at least one of the following:

a. A serving electric utility that has any of these programs available:
   1. A demand response program
   2. Real-time or next-day pricing
   3. A time-of-use price schedule applicable to the building
b. Local *building*-level electrical *demand* monitoring and *control* integrated into the *building* control *system*
c. *Buildings* or *additions* that have ≤25,000 ft^2 (2300 m^2) of *gross floor area* with a central group time control schedule for lighting or HVAC set points

Where credits are taken for measures in Section 13.5.2.8, the following additional requirements shall apply:

a. Where the serving utility has an interface requirement for participation in items (a1) through (a3) above, an interface compliant with serving utility requirements shall be installed.
b. The *building* shall have a *building* automation control *system* configured with *automatic* load management controls that are activated by either a utility demand response signal, real-time or next-day peak-price-period notifications, or local *building* peak electrical *demand* monitoring. *Buildings* or *additions*

Table 13.5.2.7.2-4 Minimum *Efficiency* Requirements: Commercial Ovens (I-P)

Fuel Type	Classification	Idle Rate	Cooking *Energy Efficiency*,%	Test Procedure
Convection Ovens				
Gas	Full size	≤12,000 Btu/h	≥46	ASTM F1496-13
Electric	Half size	≤1.0 *kW*	≥71	
	Full size	≤1.60 *kW*		
Combination Ovens[a]				
Gas	Steam mode	≤200P + 6511 Btu/h	≥41	ASTM F2861-17
	Convection mode	≤150P + 5425 Btu/h	≥56	
Electric	Steam mode	≤0.133P + 0.6400 *kW*	≥55	
	Convection mode	≤0.080P + 0.4989 *kW*	≥76	
Rack Ovens				
Gas	Single	≤25,000 Btu/h	≥48	ASTM F2093-18
	Double	≤30,000 Btu/h	≥52	

a. P = pan capacity, the number of steam table pans the combination oven is able to accommodate as per ASTM F1495-14a.

Table 13.5.2.7.2-4 Minimum *Efficiency* Requirements: Commercial Ovens (SI)

Fuel Type	Classification	Idle Rate	Cooking *Energy Efficiency*,%	Test Procedure
Convection Ovens				
Gas	Full size	≤3520 W	≥46	ASTM F1496-13
Electric	Half size	≤1.0 *kW*	≥71	
	Full size	≤1.60 *kW*		
Combination Ovens[a]				
Gas	Steam mode	≤59P + 1900 W	≥41	ASTM F2861-17
	Convection mode	≤44P + 1590 W	≥56	
Electric	Steam mode	≤0.133P + 0.6400 *kW*	≥55	
	Convection mode	≤0.080P + 0.4989 *kW*	≥76	
Rack Ovens				
Gas	Single	≤7300 W	≥48	ASTM F2093-18
	Double	≤8800 W	≥52	

a. P = pan capacity, the number of steam table pans the combination oven is able to accommodate as per ASTM F1495-14a.

that have ≤25,000 ft^2 (2300 m^2) of *gross floor area* shall be permitted to use a centralized group time control schedule for load management control.

c. Load management *control* sequences shall be implemented so that they are activated in response to either an automated serving utility signal; local *building* peak electrical *demand* monitoring; or, where *buildings* or *additions* have ≤25,000 ft^2 (2300 m^2) of *gross floor area*, on a schedule where peak-price-period dates and times shall be adjustable without reprogramming.

13.5.2.8.1 G01: Lighting Load Management. To achieve this credit, luminaires shall have dimming capability, and load management controls shall gradually, over a period of not more than 15 minutes, reduce *general lighting* power with *continuous dimming* in 75% of the project area by at least 20% during peak-price periods coincident with high *building* load. It shall be permitted to substitute decorative and display-lighting equivalent power reductions for *general lighting* reductions. Where less than 75% but at least 50%

of the project *general lighting* is controlled, the base credits from the tables in Section 13.5.3 shall be prorated as follows:

$$\frac{\text{Portion of project with lighting load management, \%}}{75\%} \times \text{G01 table credits}$$

Exception to 13.5.2.8.1: Warehouse, semiheated, or retail storage areas with load management controls shall be permitted to switch off at least 25% of lighting power in 75% of the project area without dimming.

13.5.2.8.2 G02: HVAC Load Management. To achieve this credit, load management controls shall be configured to

a. gradually increase cooling *set point* by at least 3°F (1.7°C) or reduce effective cooling capacity to 60% of installed capacity during the period of coincident high *building* load and summer peak prices;
b. where electric heating is used, gradually reduce heating *set point* by at least 3°F (1.7°C) or reduce effective heating capacity to 60% of installed capacity during the period of coincident high *building* load and winter peak prices; and
c. provide excess *outdoor air* preceding the peak summer price period and reduce *outdoor air* by at least 30% during the period of coincident high *building* load and summer peak prices, in accordance with ASHRAE Standard 62.1, Section 6.2.5.2.

13.5.2.8.3 G03: Automated Shading Load Management. To achieve this credit, movable exterior shading devices shall be installed to reduce solar gain through south-oriented and west-oriented *fenestration* by at least 50% with load management controls that operate during peak summer electrical price periods.

Informative Note: This credit can be met by exterior roller, movable blind, or movable shutter shading devices; however, base overhang, screen or shutter, shading will not meet the requirement. Roller shades that reject solar gain but still allow a view are allowed as long as they provide an effective 50% reduction in net solar gain—e.g., have a shading coefficient of less than 0.5 for the shading material itself. Interior shading devices will not meet the requirement.

13.5.2.8.4 G04: Electric Energy Storage. To achieve this credit, electric storage devices such as batteries or flywheel devices shall be charged by load management controls to store electricity during off-peak periods and use stored *energy* during on-peak periods to reduce *building* peak period *demand*. Electric storage devices shall have a capacity between 0.5 Wh/ft^2 (5 Wh/m^2) and 15 Wh/ft^2 (160 Wh/m^2) based on project *gross floor area*. For capacity other than 1.0 Wh/ft^2 (10.7 Wh/m^2), credits can be prorated as follows:

$$\frac{\text{Installed electric storage capacity, Wh/ft}^2}{1.0} \times \text{G04 table credits} \quad \text{(I-P)}$$

$$\frac{\text{Installed electric storage capacity, Wh/m}^2}{10.7} \times \text{G04 table credits} \quad \text{(SI)}$$

13.5.2.8.5 G05: HVAC Cooling Energy Storage. To achieve this credit, ice or chilled-water storage *equipment* shall be installed and load management controls configured to reduce electric cooling peak demand. Storage tank(s) shall be demonstrated through analysis to have less than 2% loss of stored capacity over a 24-hour period for the cooling design day.

Base energy credits in Section 13.5.3 are for storage capacity of 1.0 ton-hours storage per ton (kWh/*kW*) of design-day cooling load with a 1.15 sizing factor. Prorate energy credits for other installed storage systems sized between 0.5 and 4.0 ton-hours storage per ton (kWh/*kW*) of design-day cooling load. Larger storage shall be permitted; however, credits are limited to 4.0 ton-hours storage per ton (kWh/*kW*) of design-day cooling load. Energy credits shall be determined as follows:

$$EC_{G05\_adj} = EC_{G05\_base} \times \frac{(1.44 \times SR + 0.71)}{2.15}$$

where

EC_{G05_adj} = energy credits achieved for HVAC cooling energy storage

EC_{G05_base} = G05 base energy credit for *building* use type and climate zone based on 1.0 ton-hours storage per ton (kWh/*kW*) of design-day cooling load

SR = storage ratio in ton-hours storage per ton (kWh/*kW*) of design-day cooling load, where $0.5 \le SR \le 4.0$

13.5.2.8.6 G06: Service Hot-Water Thermal Storage. To achieve this credit, where service hot water is heated by electricity, *automatic* controls activated by utility demand response signal, peak price period time control, or local *building demand* monitoring shall preheat stored service hot water before the peak-price period and suspend electric water heating during the period of peak prices coincident with peak *building* load. Storage capacity shall be provided by either of the following:

a. Preheating water above 140°F (60°C) delivery temperature with at least 1.2 kWh of *energy* storage per *kW* of water heating capacity. Tempering valves shall be provided at the *water heater* delivery location. This option is not available where heat-pump water heating is used.
b. Providing additional heated water tank storage capacity above peak service hot-water demand with equivalent peak storage capacity to item (a).

13.5.2.8.7 G07: Building Thermal Mass. To achieve this credit, the project shall have both additional passive interior mass and a night flush *control* of the *HVAC system*. The credit is only available to projects that have at least 80% of *gross floor area* unoccupied between midnight and 6:00 a.m.

a. Interior to the *building envelope* insulation, provide 10 lb/ft^2 (50 kg/m^2) of project *conditioned floor area* of passive thermal mass in the *building* interior *wall*, the inside of the *exterior wall*, or interior *floor construction*. Mass *construction* shall have mass surfaces directly contacting the air in *conditioned spaces* with directly attached gypsum panels allowed. Mass with carpet or furred gypsum panels, or *exterior wall* mass that is on the exterior of the insulation layer (e.g., the portion of CMU block on the exterior of insulation filled cell cavities), shall not be included toward the *building* mass required.
b. HVAC units for 80% or more of the supply airflow in the project shall be equipped with *outdoor air* economizers and fans that have variable or low speed capable of operating at 66% or lower airflow and be included in the night flush *control* sequence
c. Night flush controls shall be configured with the following sequence, or another night flush strategy shall be permitted where it is demonstrated to be effective, avoids added morning heating, and is approved by the *authority having jurisdiction*.
    1. Summer mode shall be activated when *outdoor air* temperature exceeds 70°F (21°C) and shall continue uninterrupted until deactivated when *outdoor air* temperature falls below 45°F (7°C). During summer mode, the occupied cooling *set point* shall be set 1°F (0.6°C) higher than normal, and the occupied heating *set point* shall be *reset* 2°F (1.1°C) lower than normal.
    2. Night flush shall be activated when all of the following conditions exist:
        i. Summer mode is active in accordance with item (c1).
        ii. *Outdoor air* temperature is 5°F (2.8°C) or more below indoor average zone temperature.
        iii. Indoor average zone temperature is greater than morning occupied heating *set point*.
        iv. In climate zones 0A through 3A, outdoor dew point is below 50°F (10°C), or *outdoor air* enthalpy is less than indoor air enthalpy.
        v. Local time is between 10:00 pm and 6:00 am.
    3. When night flush is active, *automatic* night flush controls shall operate *outdoor air economizers* at low fan speed not exceeding 66% during the unoccupied period with *mechanical cooling* and heating locked out.
d. The project shall demonstrate a contractual obligation for postoccupancy commissioning and control tuning in the spring or fall season to tune the summer mode activation set points and occupied heating set point, or other algorithms to achieve minimal morning heating due to night flush activation, while maintaining comfort conditions. Commissioning shall include monitoring of time-series space temperature, heating, and cooling operation to demonstrate both night cooling and minimization of morning heating along with monitoring of post-tuning operation to verify tuned parameters. Operating manuals shall include recommendations for tuned parameters and narrative training for operating staff on night flush automated settings.

Informative Note: The simplified night flush sequence described will operate in summer mode below the 70°F (21°C) outdoor air trigger temperature until outdoor air of 45°F (7°C) is reached and summer mode is deactivated. Summer mode is reestablished when the outdoor air rises above 70°F (21°C) again. These set points need to be tuned under actual occupancy conditions, as building load characteristics vary. Other strategies may be implemented that cool the space below the heating set point and adjust the morning heating set point to avoid morning reheating.

13.5.3 Base Energy Credits Available. Base energy credits are shown in Tables 13.5.3-1 through 13.5.3-9, where the table is selected for the *building* use type, and the base credit is selected for the climate zone of the *building*.

13.6 Alternative Compliance Path (Not used)

13.7 Submittals

13.7.1 General. Compliance documentation and supplemental information shall be submitted in accordance with Section 4.2.2 of this standard.

13.7.2 Permit Application Documentation. *Construction documents* shall list which credits were used to meet the requirements of Section 13.5 for this project.

13.7.3 Completion Requirements. *Construction documents* shall require that *equipment*, controls, or *systems* installed to meet the requirements of Section 13.5 shall meet completion requirements as specified in Sections 5.7.3, 6.7.3, 7.7.3, 8.7.3, 9.7.3, and 10.7.3.

13.8 Product Information (Not used)

13.9 Verification, Testing, and Commissioning. *Building envelope components*, *equipment*, controls, or *systems* installed to meet the requirements of Section 13.5 shall meet verification, testing, and *commissioning* requirements as specified in Sections 5.9, 6.9, 7.9, 8.9, 9.9, and 10.9.

Table 13.5.3-1 Energy Credits for Multifamily

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Improved Envelope Performance	13.5.2.1	Determined in accordance with Section 13.5.2.1																		
H02	Heating *Efficiency*	13.5.2.2.2	×	×	×	×	×	×	1	×	×	4	×	2	5	2	1	6	4	6	9
H03	Cooling *Efficiency*	13.5.2.2.3	19	17	14	14	11	9	6	7	3	4	5	2	3	4	2	3	3	2	2
H04	*Residential* HVAC Controls	13.5.2.2.4	10	11	8	12	10	12	8	9	12	9	11	7	9	11	7	10	10	8	8
H05	Ground-Source Heat Pump	13.5.2.2.5	9	8	5	7	4	4	5	4	2	10	5	6	13	9	4	18	13	16	16
H06	DOAS/Fan Controls	13.5.2.2.6	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H07	Guideline 36 Sequences	13.5.2.2.7	3	3	3	3	2	2	2	2	1	2	2	1	2	2	1	2	2	2	2
W01	SHW Preheat Recovery	13.5.2.3.1(a)	10	11	13	13	15	16	19	18	23	21	21	24	22	22	25	21	23	23	23
W02	Heat-Pump *Water Heater*	13.5.2.3.1(b)	16	17	20	20	24	25	30	29	36	33	33	39	36	36	41	35	37	37	38
W03	Efficient Gas *Water Heater*	13.5.2.3.1(c)	12	13	16	15	18	19	23	22	27	25	25	29	26	27	30	26	27	27	27
W04	SWH Pipe Insulation	13.5.2.3.2	2	2	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3	3
W05	Point-of-Use *Water Heaters*	13.5.2.3.3 a	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W06	Thermostatic Balancing Valves	13.5.2.3.3 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W07	SHW Submeters	13.5.2.3.4	3	4	4	4	5	5	7	6	8	7	7	8	8	8	9	8	8	8	8
W08	SHW Distribution Sizing	13.5.2.3.5	10	11	13	13	16	16	20	19	24	22	22	25	23	23	27	23	24	24	24
W09	Shower Drain Heat Recovery	13.5.2.3.6	9	9	11	11	13	14	17	16	20	19	19	22	20	20	23	20	21	21	21
P01	*Energy* Monitoring	13.5.2.4	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
L02	Lighting Dimming and Tuning	13.5.2.5.2	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1
L03	Increase *Occupancy Sensor*	13.5.2.5.3	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
L04	Increase *Daylight Area*	13.5.2.5.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
L05	*Residential* Light Controls	13.5.2.5.5	9	9	10	9	10	10	9	10	11	9	9	10	7	9	10	7	8	8	6
L06	Light Power Reduction	13.5.2.5.6	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1
R01	On-Site Renewable *Energy*	13.5.2.6	12	13	15	14	15	18	16	19	21	13	19	14	11	17	13	12	14	11	9
Q01	Efficient Elevator Equipment	13.5.2.7.1	4	4	5	5	5	5	5	5	6	5	5	6	5	5	6	5	5	5	5

× = Credits excluded from this *building* use type and climate zone.

Table 13.5.3-1 Energy Credits for Multifamily *(Continued)*

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
Q02	Efficient Kitchen *Equipment*	13.5.2.7.2	Commercial kitchens and dining areas are a restaurant building use type in accordance with Section 13.5.1(a).																		
Q03	Fault Detection and Diagnostics	13.5.2.7.3	3	3	3	3	2	2	2	2	1	2	2	1	2	2	1	2	2	2	2
G01	Lighting Load Management	13.5.2.8.1	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
G02	HVAC Load Management	13.5.2.8.2	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
G03	Shading Load Management	13.5.2.8.3	11	×	7	18	10	13	4	13	12	×	13	6	8	11	11	×	6	5	14
G04	Electric Energy Storage	13.5.2.8.4	7	8	9	8	10	9	10	11	14	13	10	13	11	10	13	11	10	11	12
G05	HVAC Cooling Energy Storage	13.5.2.8.5	22	5	27	12	19	18	19	33	10	11	20	9	7	14	8	6	15	1	3
G06	SHW Thermal Storage	13.5.2.8.6	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
G07	*Building* Mass/Night Flush	13.5.2.8.7	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×

× = Credits excluded from this *building* use type and climate zone.

Table 13.5.3-2 Energy Credits for Health Care Buildings

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Improved Envelope Performance	13.5.2.1	Determined in accordance with Section 13.5.2.1																		
H02	Heating *Efficiency*	13.5.2.2.2	1	1	1	1	2	2	2	2	2	3	2	3	4	3	4	6	5	7	9
H03	Cooling *Efficiency*	13.5.2.2.3	18	16	15	15	14	10	9	8	8	7	6	5	5	5	3	5	4	4	2
H04	*Residential* HVAC Controls	13.5.2.2.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H05	Ground-Source Heat Pump	13.5.2.2.5	3	14	×	14	14	11	9	10	12	11	10	11	11	10	15	14	14	16	15
H06	DOAS/Fan Controls	13.5.2.2.6	20	19	18	18	17	16	15	15	15	13	15	13	11	14	10	9	9	6	2
H07	Guideline 36 Sequences	13.5.2.2.7	4	3	3	3	3	3	3	3	2	3	3	2	3	3	2	3	3	3	3
W01	SHW Preheat Recovery	13.5.2.3.1 a	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
W02	Heat-Pump *Water Heater*	13.5.2.3.1 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W03	Efficient Gas *Water Heater*	13.5.2.3.1 c	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W04	SWH Pipe Insulation	13.5.2.3.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W05	Point-of-Use *Water Heaters*	13.5.2.3.3 a	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W06	Thermostatic Balancing Valves	13.5.2.3.3 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W07	SHW Submeters	13.5.2.3.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W08	SHW Distribution Sizing	13.5.2.3.5	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W09	Shower Drain Heat Recovery	13.5.2.3.6	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
P01	*Energy* Monitoring	13.5.2.4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
L02	Lighting Dimming and Tuning	13.5.2.5.2	6	6	6	6	6	6	6	6	7	6	7	7	6	7	7	6	6	5	5
L03	Increase *Occupancy Sensor*	13.5.2.5.3	1	1	1	1	1	2	2	1	2	2	1	2	2	1	2	1	1	1	1
L04	Increase *Daylight Area*	13.5.2.5.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
L05	*Residential* Light Controls	13.5.2.5.5	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
L06	Light Power Reduction	13.5.2.5.6	7	8	8	8	8	8	9	9	10	8	9	10	8	9	9	7	8	7	6
R01	On-Site Renewable *Energy*	13.5.2.6	5	5	5	5	5	7	6	7	7	5	7	5	4	6	5	5	5	4	3
Q01	Efficient Elevator Equipment	13.5.2.7.1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

× = credits excluded from this building use type and climate zone.

Table 13.5.3-2 Energy Credits for Health Care Buildings

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
Q02	Efficient Kitchen *Equipment*	13.5.2.7.2	Commercial kitchens and dining areas are a restaurant building use type in accordance with Section 13.5.1(a).																		
Q03	Fault Detection and Diagnostics	13.5.2.7.3	4	3	3	3	3	3	3	3	2	3	3	2	3	3	2	3	3	3	3
G01	Lighting Load Management	13.5.2.8.1	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
G02	HVAC Load Management	13.5.2.8.2	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
G03	Shading Load Management	13.5.2.8.3	1	1	1	1	×	×	×	1	×	×	2	×	×	2	×	×	1	1	×
G04	Electric Energy Storage	13.5.2.8.4	9	10	10	10	10	11	10	11	11	10	11	12	10	11	11	10	10	9	9
G05	HVAC Cooling Energy Storage	13.5.2.8.5	9	2	12	5	9	7	10	14	10	6	8	7	5	7	5	4	8	1	1
G06	SHW Thermal Storage	13.5.2.8.6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
G07	*Building* Mass/Night Flush	13.5.2.8.7	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×

× = credits excluded from this building use type and climate zone.

Table 13.5.3-3 Energy Credits for Hotel/Motel

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Improved Envelope Performance	13.5.2.1	Determined in accordance with Section 13.5.2.1																		
H02	Heating *Efficiency*	13.5.2.2.2	×	×	×	×	×	×	×	×	×	×	×	×	2	1	×	3	1	3	5
H03	Cooling *Efficiency*	13.5.2.2.3	24	22	19	19	15	12	10	10	7	7	7	3	5	5	3	5	4	4	2
H04	*Residential* HVAC Controls	13.5.2.2.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H05	Ground-Source Heat Pump	13.5.2.2.5	13	10	7	10	7	6	4	5	9	6	4	4	8	6	4	13	9	14	15
H06	DOAS/Fan Controls	13.5.2.2.6	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H07	Guideline 36 Sequences	13.5.2.2.7	4	4	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2
W01	SHW Preheat Recovery	13.5.2.3.1 a	3	4	4	4	5	5	6	6	7	7	7	8	8	8	9	8	8	8	9
W02	Heat-Pump *Water Heater*	13.5.2.3.1 b	5	5	7	6	8	8	10	10	11	12	11	13	13	12	14	13	13	14	14
W03	Efficient Gas *Water Heater*	13.5.2.3.1 c	4	4	5	5	6	6	8	7	8	9	8	10	10	9	10	10	10	10	10
W04	SWH Pipe Insulation	13.5.2.3.2	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
W05	Point-of-Use *Water Heaters*	13.5.2.3.3 a	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W06	Thermostatic Balancing Valves	13.5.2.3.3 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W07	SHW Submeters	13.5.2.3.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W08	SHW Distribution Sizing	13.5.2.3.5	3	4	4	4	5	6	7	6	7	8	7	9	8	8	9	9	9	9	9
W09	Shower Drain Heat Recovery	13.5.2.3.6	3	3	4	4	4	5	6	5	6	6	6	7	7	7	8	7	7	8	8
P01	*Energy* Monitoring	13.5.2.4	3	3	3	3	3	3	3	3	3	3	3	2	3	3	2	3	3	3	3
L02	Lighting Dimming and Tuning	13.5.2.5.2	1	1	2	2	1	2	2	2	2	1	2	2	2	2	2	2	2	2	2
L03	Increase *Occupancy Sensor*	13.5.2.5.3	3	4	4	4	4	5	5	4	5	4	4	5	4	4	5	4	4	4	3
L04	Increase *Daylight Area*	13.5.2.5.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
L05	*Residential* Light Controls	13.5.2.5.5	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
L06	Light Power Reduction	13.5.2.5.6	2	2	2	2	2	2	2	2	3	2	3	3	2	2	3	2	2	2	2
R01	On-Site Renewable *Energy*	13.5.2.6	7	8	9	9	9	12	10	13	13	9	13	10	8	12	9	9	10	8	7
Q01	Efficient Elevator Equipment	13.5.2.7.1	2	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	3

× = credits excluded from this building use type and climate zone.

Table 13.5.3-3 Energy Credits for Hotel/Motel *(Continued)*

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
Q02	Efficient Kitchen *Equipment*	13.5.2.7.2	Commercial kitchens and dining areas are a restaurant building use type in accordance with Section 13.5.1(a).																		
Q03	Fault Detection and Diagnostics	13.5.2.7.3	4	4	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2
G01	Lighting Load Management	13.5.2.8.1	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
G02	HVAC Load Management	13.5.2.8.2	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
G03	Shading Load Management	13.5.2.8.3	2	2	2	3	1	2	3	2	4	3	2	1	×	1	3	1	2	×	×
G04	Electric Energy Storage	13.5.2.8.4	6	7	7	8	7	9	9	12	11	11	9	11	12	11	14	11	10	10	11
G05	HVAC Cooling Energy Storage	13.5.2.8.5	18	5	25	11	19	17	22	33	20	14	19	12	12	16	8	9	19	2	3
G06	SHW Thermal Storage	13.5.2.8.6	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
G07	*Building* Mass/Night Flush	13.5.2.8.7	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×

× = credits excluded from this building use type and climate zone.

Table 13.5.3-4 Energy Credits for Office Buildings

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Improved Envelope Performance	13.5.2.1	Determined in accordance with Section 13.5.2.1																		
H02	Heating *Efficiency*	13.5.2.2.2	×	×	×	×	×	×	1	×	×	2	1	2	5	3	2	7	5	7	10
H03	Cooling *Efficiency*	13.5.2.2.3	18	18	15	16	12	10	8	8	7	6	5	3	4	4	2	4	2	3	1
H04	*Residential* HVAC Controls	13.5.2.2.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H05	Ground-Source Heat Pump	13.5.2.2.5	9	8	5	8	5	4	7	5	2	10	6	7	15	10	8	21	15	19	20
H06	DOAS/Fan Controls	13.5.2.2.6	19	19	17	18	16	16	11	14	12	9	13	8	5	10	7	3	6	3	×
H07	Guideline 36 Sequences	13.5.2.2.7	3	3	3	3	3	3	2	2	2	2	2	1	2	2	1	2	2	2	2
W01	SHW Preheat Recovery	13.5.2.3.1 a	1	1	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2
W02	Heat-Pump *Water Heater*	13.5.2.3.1 b	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
W03	Efficient Gas *Water Heater*	13.5.2.3.1 c	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3
W04	SWH Pipe Insulation	13.5.2.3.2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	1	1	1
W05	Point-of-Use *Water Heaters*	13.5.2.3.3 a	×	4	4	4	4	4	4	3	3	3	2	3	2	1	2	1	1	1	×
W06	Thermostatic Balancing Valves	13.5.2.3.3 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W07	SHW Submeters	13.5.2.3.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W08	SHW Distribution Sizing	13.5.2.3.5	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W09	Shower Drain Heat Recovery	13.5.2.3.6	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
P01	*Energy* Monitoring	13.5.2.4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
L02	Lighting Dimming and Tuning	13.5.2.5.2	5	5	6	6	6	6	6	7	7	6	7	7	6	6	7	5	6	5	5
L03	Increase *Occupancy Sensor*	13.5.2.5.3	5	6	6	6	7	6	6	6	8	6	6	7	6	6	7	6	6	5	5
L04	Increase *Daylight Area*	13.5.2.5.4	7	7	8	8	8	8	9	9	10	8	8	9	8	8	8	7	8	8	6
L05	*Residential* Light Controls	13.5.2.5.5	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
L06	Light Power Reduction	13.5.2.5.6	7	7	8	8	8	9	8	8	9	8	9	9	8	8	9	7	8	7	6
R01	On-Site Renewable *Energy*	13.5.2.6	11	11	14	13	14	16	15	18	19	13	18	14	11	16	13	12	14	12	9
Q01	Efficient Elevator Equipment	13.5.2.7.1	4	4	4	4	5	5	5	5	6	5	5	6	5	5	6	5	5	5	5

× = credits excluded from this building use type and climate zone.

Table 13.5.3-4 Energy Credits for Office Buildings *(Continued)*

ID	Energy Credit Abbreviated Title	Section	Climate Zone																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
Q02	Efficient Kitchen *Equipment*	13.5.2.7.2	Commercial kitchens and dining areas are a restaurant building use type in accordance with Section 13.5.1(a).																		
Q03	Fault Detection and Diagnostics	13.5.2.7.3	3	3	3	3	3	3	2	2	2	2	2	1	2	2	1	2	2	2	2
G01	Lighting Load Management	13.5.2.8.1	5	5	6	6	6	6	7	7	6	6	7	7	6	7	8	6	7	6	6
G02	HVAC Load Management	13.5.2.8.2	10	10	7	13	8	13	14	12	8	14	15	14	14	17	14	11	17	15	11
G03	Shading Load Management	13.5.2.8.3	8	13	15	15	14	17	14	15	16	10	16	16	13	15	16	13	15	14	21
G04	Electric Energy Storage	13.5.2.8.4	19	19	21	21	22	24	27	26	27	27	28	31	26	28	33	22	27	25	23
G05	HVAC Cooling Energy Storage	13.5.2.8.5	22	6	29	13	21	19	22	37	22	13	21	12	12	16	8	9	20	2	3
G06	SHW Thermal Storage	13.5.2.8.6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
G07	*Building* Mass/Night Flush	13.5.2.8.7	4	1	6	3	9	14	12	14	20	11	20	20	19	20	20	16	26	25	12

× = credits excluded from this building use type and climate zone.

Table 13.5.3-5 Energy Credits for Restaurant Buildings

ID	Energy Credit Abbreviated Title	Section	Climate Zone																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Improved Envelope Performance	13.5.2.1	Determined in accordance with Section 13.5.2.1																		
H02	Heating *Efficiency*	13.5.2.2.2	×	×	×	×	×	1	3	2	1	5	3	4	8	5	5	10	8	13	17
H03	Cooling *Efficiency*	13.5.2.2.3	20	18	15	16	13	10	8	7	3	5	4	1	3	3	1	3	2	2	1
H04	*Residential* HVAC Controls	13.5.2.2.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H05	Ground-Source Heat Pump	13.5.2.2.5	11	9	6	9	7	6	8	8	4	13	11	11	14	15	14	19	17	20	17
H06	DOAS/Fan Controls	13.5.2.2.6	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H07	Guideline 36 Sequences	13.5.2.2.7	4	3	3	3	3	2	2	2	1	2	2	1	2	2	1	2	2	3	3
W01	SHW Preheat Recovery	13.5.2.3.1 a	5	5	7	6	7	8	9	9	11	10	11	12	11	11	12	11	11	11	10
W02	Heat-Pump *Water Heater*	13.5.2.3.1 b	2	3	3	3	4	5	6	6	7	8	7	9	9	9	10	9	10	10	10
W03	Efficient Gas *Water Heater*	13.5.2.3.1 c	6	7	8	8	9	10	11	11	14	13	13	14	13	13	15	13	13	13	12
W04	SWH Pipe Insulation	13.5.2.3.2	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W05	Point-of-Use *Water Heaters*	13.5.2.3.3 a	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W06	Thermostatic Balancing Valves	13.5.2.3.3 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W07	SHW Submeters	13.5.2.3.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W08	SHW Distribution Sizing	13.5.2.3.5	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W09	Shower Drain Heat Recovery	13.5.2.3.6	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
P01	*Energy* Monitoring	13.5.2.4	3	3	2	2	2	2	2	2	1	2	2	1	2	2	2	2	2	2	2
L02	Lighting Dimming and Tuning	13.5.2.5.2	3	3	3	3	3	3	3	3	3	3	3	3	2	3	2	2	2	2	2
L03	Increase *Occupancy Sensor*	13.5.2.5.3	2	2	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1
L04	Increase *Daylight Area*	13.5.2.5.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
L05	*Residential* Light Controls	13.5.2.5.5	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
L06	Light Power Reduction	13.5.2.5.6	4	4	4	4	4	4	4	4	4	4	4	3	3	4	3	3	3	3	2
R01	On-Site Renewable *Energy*	13.5.2.6	2	2	2	2	2	3	2	3	3	2	3	2	2	2	2	2	2	2	1
Q01	Efficient Elevator Equipment	13.5.2.7.1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

× = credits excluded from this building use type and climate zone.

Table 13.5.3-5 Energy Credits for Restaurant Buildings *(Continued)*

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
Q02	Efficient Kitchen *Equipment*	13.5.2.7.2	19	21	24	22	24	26	26	27	31	27	28	30	26	27	30	24	26	23	22
Q03	Fault Detection and Diagnostics	13.5.2.7.3	4	3	3	3	3	2	2	2	1	2	2	1	2	2	1	2	2	3	3
G01	Lighting Load Management	13.5.2.8.1	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
G02	HVAC Load Management	13.5.2.8.2	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
G03	Shading Load Management	13.5.2.8.3	2	2	2	2	2	3	2	2	1	1	2	1	1	1	×	1	1	1	×
G04	Electric Energy Storage	13.5.2.8.4	3	3	4	4	5	5	4	4	4	3	4	3	3	4	3	3	3	3	2
G05	HVAC Cooling Energy Storage	13.5.2.8.5	4	1	5	2	4	3	4	6	2	2	3	1	1	2	×	1	2	×	×
G06	SHW Thermal Storage	13.5.2.8.6	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
G07	*Building* Mass/Night Flush	13.5.2.8.7	2	×	3	1	4	6	4	5	11	3	7	7	4	9	5	3	6	4	1

× = credits excluded from this building use type and climate zone.

Table 13.5.3-6 Energy Credits for Retail Buildings

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Improved Envelope Performance	13.5.2.1	Determined in accordance with Section 13.5.2.1																		
H02	Heating *Efficiency*	13.5.2.2.2	×	×	×	×	×	×	3	1	×	7	2	5	10	6	6	12	9	9	13
H03	Cooling *Efficiency*	13.5.2.2.3	26	24	21	22	18	15	11	11	5	7	7	2	4	5	1	4	3	3	1
H04	*Residential* HVAC Controls	13.5.2.2.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H05	Ground-Source Heat Pump	13.5.2.2.5	16	13	9	13	8	7	10	8	2	18	11	16	19	18	19	23	20	18	15
H06	DOAS/Fan Controls	13.5.2.2.6	29	30	26	28	24	25	18	23	23	12	22	15	7	17	13	3	10	5	2
H07	Guideline 36 Sequences	13.5.2.2.7	5	5	4	4	4	3	3	3	2	3	3	2	3	3	2	3	3	3	4
W01	SHW Preheat Recovery	13.5.2.3.1 a	4	4	5	4	6	6	7	7	8	7	7	8	7	7	8	6	7	7	6
W02	Heat-Pump *Water Heater*	13.5.2.3.1 b	1	1	1	1	2	2	2	2	3	2	2	3	2	2	3	2	2	2	2
W03	Efficient Gas *Water Heater*	13.5.2.3.1 c	2	2	3	2	3	3	4	4	4	4	4	4	4	4	4	3	4	4	3
W04	SWH Pipe Insulation	13.5.2.3.2	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W05	Point-of-Use *Water Heaters*	13.5.2.3.3 a	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W06	Thermostatic Balancing Valves	13.5.2.3.3 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W07	SHW Submeters	13.5.2.3.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W08	SHW Distribution Sizing	13.5.2.3.5	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W09	Shower Drain Heat Recovery	13.5.2.3.6	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
P01	*Energy* Monitoring	13.5.2.4	5	5	5	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
L02	Lighting Dimming and Tuning	13.5.2.5.2	6	6	6	6	6	6	5	6	6	4	5	5	3	4	4	3	3	2	2
L03	Increase *Occupancy Sensor*	13.5.2.5.3	6	6	6	6	6	6	5	6	6	4	5	5	3	4	4	3	4	2	2
L04	Increase *Daylight Area*	13.5.2.5.4	7	7	8	7	7	7	6	7	7	4	6	5	4	5	4	3	4	4	3
L05	*Residential* Light Controls	13.5.2.5.5	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
L06	Light Power Reduction	13.5.2.5.6	11	11	12	12	12	12	11	12	14	10	11	9	8	8	9	8	8	7	6
R01	On-Site Renewable *Energy*	13.5.2.6	9	9	11	11	13	16	14	18	19	12	17	13	10	15	12	10	12	10	7
Q01	Efficient Elevator Equipment	13.5.2.7.1	3	3	4	4	4	5	5	5	6	5	5	5	5	5	5	4	4	4	4

× = credits excluded from this building use type and climate zone.

Table 13.5.3-6 Energy Credits for Retail Buildings *(Continued)*

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
Q02	Efficient Kitchen *Equipment*	13.5.2.7.2	Commercial kitchens and dining areas are a restaurant building use type in accordance with Section 13.5.1(a).																		
Q03	Fault Detection and Diagnostics	13.5.2.7.3	5	5	4	4	4	3	3	3	2	3	3	2	3	3	2	3	3	3	4
G01	Lighting Load Management	13.5.2.8.1	9	8	10	10	11	11	11	12	12	10	12	12	11	11	12	11	11	9	8
G02	HVAC Load Management	13.5.2.8.2	14	13	14	14	12	10	10	7	5	7	1	3	6	×	×	7	4	6	1
G03	Shading Load Management	13.5.2.8.3	2	4	6	3	6	4	2	×	8	×	1	2	2	×	×	×	×	3	1
G04	Electric Energy Storage	13.5.2.8.4	5	8	6	7	9	10	10	9	11	10	8	9	8	10	9	9	7	8	6
G05	HVAC Cooling Energy Storage	13.5.2.8.5	24	6	35	15	26	23	28	40	18	15	23	9	10	16	3	8	16	2	2
G06	SHW Thermal Storage	13.5.2.8.6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
G07	*Building* Mass/Night Flush	13.5.2.8.7	4	1	6	2	8	14	11	14	32	9	20	20	16	20	18	13	23	21	10

× = credits excluded from this building use type and climate zone.

Table 13.5.3-7 Energy Credits for Education Buildings

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Improved Envelope Performance	13.5.2.1	Determined in accordance with Section 13.5.2.1																		
H02	Heating *Efficiency*	13.5.2.2.2	×	×	×	×	×	×	1	1	1	2	2	3	3	4	2	5	4	7	11
H03	Cooling *Efficiency*	13.5.2.2.3	24	23	19	21	18	15	12	12	10	9	9	5	6	7	3	6	5	5	2
H04	*Residential* HVAC Controls	13.5.2.2.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H05	Ground-Source Heat Pump	13.5.2.2.5	13	12	8	12	8	7	6	8	5	6	9	11	7	13	6	12	9	12	12
H06	DOAS/Fan Controls	13.5.2.2.6	28	27	25	26	23	23	19	21	19	17	19	13	14	14	13	11	13	9	2
H07	Guideline 36 Sequences	13.5.2.2.7	5	4	4	4	4	3	3	3	2	3	3	2	3	3	2	3	3	3	3
W01	SHW Preheat Recovery	13.5.2.3.1 a	1	1	2	1	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3
W02	Heat-Pump *Water Heater*	13.5.2.3.1 b	1	1	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3
W03	Efficient Gas *Water Heater*	13.5.2.3.1 c	1	1	2	2	2	2	3	3	3	3	3	4	4	4	4	3	4	4	4
W04	SWH Pipe Insulation	13.5.2.3.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W05	Point-of-Use *Water Heaters*	13.5.2.3.3 a	1	2	2	2	2	2	2	2	3	2	3	3	3	3	3	2	3	2	2
W06	Thermostatic Balancing Valves	13.5.2.3.3 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W07	SHW Submeters	13.5.2.3.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W08	SHW Distribution Sizing	13.5.2.3.5	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W09	Shower Drain Heat Recovery	13.5.2.3.6	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
P01	*Energy* Monitoring	13.5.2.4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3
L02	Lighting Dimming and Tuning	13.5.2.5.2	5	5	6	6	6	7	6	7	8	7	7	8	7	7	7	6	6	6	5
L03	Increase *Occupancy Sensor*	13.5.2.5.3	4	4	5	5	6	6	6	7	7	7	7	6	6	6	7	5	6	5	4
L04	Increase *Daylight Area*	13.5.2.5.4	6	7	8	7	7	8	8	9	10	8	8	9	8	8	9	7	8	8	6
L05	*Residential* Light Controls	13.5.2.5.5	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
L06	Light Power Reduction	13.5.2.5.6	7	7	8	8	8	9	9	10	11	9	9	10	9	9	10	8	9	8	7
R01	On-Site Renewable *Energy*	13.5.2.6	10	11	13	12	14	18	16	20	21	15	21	16	13	19	15	14	16	13	10
Q01	Efficient Elevator Equipment	13.5.2.7.1	3	4	4	4	5	5	5	6	6	6	6	6	6	6	7	6	6	6	5

× = credits excluded from this building use type and climate zone.

Table 13.5.3-7 Energy Credits for Education Buildings *(Continued)*

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
Q02	Efficient Kitchen *Equipment*	13.5.2.7.2	Commercial kitchens and dining areas are a restaurant building use type in accordance with Section 13.5.1(a).																		
Q03	Fault Detection and Diagnostics	13.5.2.7.3	5	4	4	4	4	3	3	3	2	3	3	2	3	3	2	3	3	3	3
G01	Lighting Load Management	13.5.2.8.1	2	3	3	3	3	4	3	4	3	3	4	4	2	4	5	4	3	3	3
G02	HVAC Load Management	13.5.2.8.2	6	5	8	6	6	8	6	6	5	6	8	6	5	8	3	4	7	4	2
G03	Shading Load Management	13.5.2.8.3	9	13	16	12	18	17	16	18	13	11	17	16	10	15	14	12	10	15	15
G04	Electric Energy Storage	13.5.2.8.4	12	12	13	13	14	16	16	17	20	16	18	18	17	18	18	15	17	15	14
G05	HVAC Cooling Energy Storage	13.5.2.8.5	26	7	37	17	30	28	36	40	38	23	37	22	20	28	13	16	32	3	4
G06	SHW Thermal Storage	13.5.2.8.6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
G07	*Building* Mass/Night Flush	13.5.2.8.7	4	1	6	2	8	14	11	14	20	10	20	20	19	30	19	16	20	20	10

× = credits excluded from this building use type and climate zone.

Table 13.5.3-8 Energy Credits for Warehouses

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Improved Envelope Performance	13.5.2.1	Determined in accordance with Section 13.5.2.1																		
H02	Heating *Efficiency*	13.5.2.2.2	×	×	×	×	×	×	5	1	×	14	6	8	21	13	7	24	18	23	24
H03	Cooling *Efficiency*	13.5.2.2.3	13	13	9	10	7	6	3	4	1	1	2	×	1	1	×	×	×	×	×
H04	*Residential* HVAC Controls	13.5.2.2.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H05	Ground-Source Heat Pump	13.5.2.2.5	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H06	DOAS/Fan Controls	13.5.2.2.6	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H07	Guideline 36 Sequences	13.5.2.2.7	3	3	2	3	2	2	2	2	1	3	2	2	4	3	2	4	3	4	4
W01	SHW Preheat Recovery	13.5.2.3.1 a	2	2	3	2	3	3	3	3	4	3	3	3	2	3	3	2	2	2	2
W02	Heat-Pump *Water Heater*	13.5.2.3.1 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W03	Efficient Gas *Water Heater*	13.5.2.3.1 c	1	1	1	1	2	2	2	2	2	1	2	2	1	2	2	1	1	1	1
W04	SWH Pipe Insulation	13.5.2.3.2	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W05	Point-of-Use *Water Heaters*	13.5.2.3.3 a	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W06	Thermostatic Balancing Valves	13.5.2.3.3 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W07	SHW Submeters	13.5.2.3.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W08	SHW Distribution Sizing	13.5.2.3.5	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W09	Shower Drain Heat Recovery	13.5.2.3.6	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
P01	*Energy* Monitoring	13.5.2.4	5	5	6	6	6	6	6	6	6	5	6	6	5	6	6	6	6	6	6
L02	Lighting Dimming and Tuning	13.5.2.5.2	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
L03	Increase *Occupancy Sensor*	13.5.2.5.3	6	6	7	6	7	7	7	7	9	6	7	7	5	6	8	5	6	5	4
L04	Increase *Daylight Area*	13.5.2.5.4	15	14	18	16	18	18	17	18	21	14	17	17	12	15	17	11	14	12	10
L05	*Residential* Light Controls	13.5.2.5.5	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
L06	Light Power Reduction	13.5.2.5.6	14	14	17	16	17	17	16	18	19	13	16	17	11	14	17	11	14	11	10
R01	On-Site Renewable *Energy*	13.5.2.6	44	41	54	49	56	62	52	67	72	38	64	45	28	49	42	24	33	24	19
Q01	Efficient Elevator Equipment	13.5.2.7.3	5	4	5	5	6	5	5	6	6	5	5	6	4	5	6	3	4	3	3

× = credits excluded from this building use type and climate zone.

Table 13.5.3-8 Energy Credits for Warehouses *(Continued)*

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
Q02	Efficient Kitchen *Equipment*	13.5.2.7.2	Commercial kitchens and dining areas are a restaurant building use type in accordance with Section 13.5.1(a).																		
Q03	Fault Detection and Diagnostics	13.5.2.7.3	3	3	2	3	2	2	2	2	1	3	2	2	4	3	2	4	3	4	4
G01	Lighting Load Management	13.5.2.8.1	6	7	8	7	8	9	8	9	9	6	8	9	6	7	9	5	7	5	5
G02	HVAC Load Management	13.5.2.8.2	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
G03	Shading Load Management	13.5.2.8.3	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
G04	Electric Energy Storage	13.5.2.8.4	33	34	40	35	41	39	40	43	49	34	40	42	29	34	42	22	28	23	24
G05	HVAC Cooling Energy Storage	13.5.2.8.5	40	15	40	32	40	40	32	40	17	12	26	4	5	12	1	3	7	×	×
G06	SHW Thermal Storage	13.5.2.8.6	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
G07	*Building* Mass/Night Flush	13.5.2.8.7	4	1	6	3	9	15	12	14	20	9	20	20	14	20	19	10	20	15	6

× = credits excluded from this building use type and climate zone.

Table 13.5.3-9 Energy Credits for Other Buildings

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Improved Envelope Performance	13.5.2.1	Determined in accordance with Section 13.5.2.1																		
H02	Heating *Efficiency*	13.5.2.2.2	×	×	×	×	×	×	2	×	×	5	3	4	7	5	4	9	7	9	12
H03	Cooling *Efficiency*	13.5.2.2.3	20	17	14	15	12	10	7	7	5	5	5	3	3	4	2	4	3	3	2
H04	*Residential* HVAC Controls	13.5.2.2.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H05	Ground-Source Heat Pump	13.5.2.2.5	11	11	7	10	8	6	7	7	5	11	8	10	13	12	10	18	15	17	17
H06	DOAS/Fan Controls	13.5.2.2.6	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
H07	Guideline 36 Sequences	13.5.2.2.7	4	4	3	3	3	3	2	2	2	3	2	2	3	3	2	3	3	3	3
W01	SHW Preheat Recovery	13.5.2.3.1 a	3	4	5	4	5	6	6	6	8	7	7	8	7	7	8	7	7	7	7
W02	Heat-Pump *Water Heater*	13.5.2.3.1 b	4	4	4	4	5	6	7	6	8	8	7	9	8	8	9	8	9	9	9
W03	Efficient Gas *Water Heater*	13.5.2.3.1 c	4	4	5	5	5	6	7	7	8	7	7	8	8	8	9	8	8	8	8
W04	SWH Pipe Insulation	13.5.2.3.2	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
W05	Point-of-Use *Water Heaters*	13.5.2.3.3 a	1	3	3	3	3	3	3	3	3	3	3	3	3	2	3	2	2	2	2
W06	Thermostatic Balancing Valves	13.5.2.3.3 b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W07	SHW Submeters	13.5.2.3.4	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W08	SHW Distribution Sizing	13.5.2.3.5	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
W09	Shower Drain Heat Recovery	13.5.2.3.6	4	4	5	5	6	7	8	8	9	9	9	10	10	10	11	10	10	10	10
P01	*Energy* Monitoring	13.5.2.4	4	4	4	4	4	4	4	4	3	3	4	3	3	4	3	4	4	4	4
L02	Lighting Dimming and Tuning	13.5.2.5.2	4	4	4	4	4	4	4	5	5	4	5	5	4	4	4	4	4	3	3
L03	Increase *Occupancy Sensor*	13.5.2.5.3	4	4	5	4	5	5	5	5	6	4	5	5	4	4	5	4	4	3	3
L04	Increase *Daylight Area*	13.5.2.5.4	9	9	11	10	10	10	10	11	12	9	10	10	8	9	10	7	9	8	6
L05	*Residential* Light Controls	13.5.2.5.5	9	9	10	9	10	10	9	10	11	9	9	10	7	9	10	7	8	8	6
L06	Light Power Reduction	13.5.2.5.6	6	6	6	6	6	7	6	7	8	6	7	7	6	6	6	5	6	5	4
R01	On-Site Renewable *Energy*	13.5.2.6	13	13	15	14	16	19	16	21	22	13	20	15	11	17	14	11	13	11	8
Q01	Efficient Elevator Equipment	13.5.2.7.1	3	3	4	4	4	4	4	4	5	4	4	5	4	4	5	4	4	4	4

× = credits excluded from this building use type and climate zone.

Table 13.5.3-9 Energy Credits for Other Buildings *(Continued)*

ID	Energy Credit Abbreviated Title	Section	Climate Zone																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
Q02	Efficient Kitchen *Equipment*	13.5.2.7.2	Commercial kitchens and dining areas are a restaurant building use type in accordance with Section 13.5.1(a).																		
Q03	Fault Detection and Diagnostics	13.5.2.7.3	4	4	3	3	3	3	2	2	2	3	2	2	3	3	2	3	3	3	3
G01	Lighting Load Management	13.5.2.8.1	6	6	7	7	7	8	7	8	8	6	8	8	6	7	9	7	7	6	6
G02	HVAC Load Management	13.5.2.8.2	10	9	10	11	9	10	10	8	6	9	8	8	8	13	9	7	9	8	5
G03	Shading Load Management	13.5.2.8.3	5	6	7	8	9	9	7	9	9	6	8	7	7	8	11	7	6	7	13
G04	Electric Energy Storage	13.5.2.8.4	12	13	14	13	15	15	16	17	18	16	16	17	15	16	18	13	14	13	13
G05	HVAC Cooling Energy Storage	13.5.2.8.5	21	6	26	13	21	19	22	30	17	12	20	10	9	14	7	7	15	2	3
G06	SHW Thermal Storage	13.5.2.8.6	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
G07	*Building* Mass/Night Flush	13.5.2.8.7	4	1	5	2	8	13	10	12	20	8	19	20	14	25	16	12	20	18	8

× = credits excluded from this building use type and climate zone.

Modify Appendix C as shown (I-P and SI).

C3.6 Calculation of Base Envelope Performance Factor. The simulation model for calculating the *base envelope performance factor* shall modify the simulation model for calculating the *proposed envelope performance factor* as follows:

a. All *opaque* assemblies shall be modeled with the maximum *U-factor* required in Section 5.5.3 for the appropriate *class of construction*, *space conditioning category*, and climate zone. *Mass walls* and *mass floors* shall be modeled with *HC* equal to 7.2 Btu/ft^2·°F. All other *opaque* assemblies shall be modeled with the same *HC* as the *proposed design*. *Mass walls* shall be modeled with equal mass on each side of the insulation. All other *opaque* assemblies shall be modeled with insulation on the exterior.

b. The exterior *roof* surfaces shall be modeled with a solar *reflectance* and thermal *emittance* as required in Section 5.5.3.1.1(a). All other *roofs*, including *roofs* exempted from the requirements in Section 5.5.3.1.1, shall be modeled the same as in the *proposed design*.

c. *Fenestration* shall be assumed to be flush with the *wall* or *roof*. ~~If the *fenestration area* for new *buildings* or *additions* exceeds the maximum allowed by Section 5.5.4.2, the area shall be reduced proportionally along each exposure until the limit set in Section 5.5.4.2 is met. If the *fenestration area* facing west or east of the *proposed design* exceeds the area limit set in Section 5.5.4.5, the *baseline building performance* shall be generated by simulating the *building* with its actual *orientation* and again after rotating the entire *building* 90, 180, and 270 degrees, then averaging the results of the four simulations.~~ *Fenestration U-factor* and *SHGC* shall be the maximum allowed for the appropriate *class of construction*, *space conditioning category*, and climate zone in accordance with Section 5.5.4. Where there is no *SHGC* requirement, the *SHGC* shall be equal to 0.40 for all *vertical fenestration* and 0.55 for *skylights*. The *VT* for *fenestration* in the base envelope design shall be equal to 1.10 times the *SHGC*. The *fenestration area* for new *buildings* or *additions* shall be modeled the same as the proposed *building* unless the following apply:

   1. Where the *fenestration area* exceeds the maximum allowed by Section 5.5.4.2, the area shall be reduced proportionally along each exposure until the limit set in Section 5.5.4.2 is met.
   2. Where the *fenestration area* facing west or east of the *proposed design* exceeds the area limit set in Section 5.5.4.5, the *baseline building performance* shall be generated by simulating the *building* with its actual *orientation* and again after rotating the entire *building* 90, 180, and 270 degrees and averaging the results of the four simulations.
   3. Where the Normative Appendix C calculation is being used to determine energy credits in accordance with Section 13.5.2.1, for *building* use types included in Table G3.1.1-1 where the proposed *fenestration area* is less than the value in Table G3.1.1-1, *vertical fenestration* areas shall equal that in Table G3.1.1-1 based on the area of gross *above-grade walls* that separate *conditioned spaces* and *semiheated spaces* from the exterior. Follow additional *fenestration* modeling requirements for *baseline building performance* in Table G.3.1.

d. Manually operated interior shades shall be modeled on all *vertical fenestration* as described in Section C3.5.5.1. Permanent shading devices, such as fins and overhangs, shall not be modeled.

e. *Daylight areas* and *photosensor* locations shall be modeled as described in Section C3.5.3 after reducing the *fenestration area* as described in Section C3.6(c).

Modify Informative Appendix E as shown (I-P and SI).

Illuminating Engineering Society
120 Wall St. Fl 17
New York, NY 10005-4026
(212) 248-5000
www.ies.org/

Subsection No.	Reference	Title/Source
[. . .]		
13.5.2.5	www.ies.org/standards/lighting-library/the-interactive-illuminance-selector (includes recommended illuminance levels from the following standards):	The Interactive Illuminance Selector
	ANSI/IES RP-1-2020	Recommended Practice: Lighting Offices Spaces
	ANSI/IES RP-2-2020	Recommended Practice: Lighting Retail Spaces
	ANSI/IES RP-3-2020	Recommended Practice: Lighting Educational Facilities
	ANSI/IES RP-4-2020	Recommended Practice: Lighting Library Spaces
	ANSI/IES RP-6-2020	Recommended Practice: Lighting Sports and Recreational Areas
	ANSI/IES RP-7-2020	Recommended Practice: Lighting Industrial Facilities
	ANSI/IES RP-8-2021	Recommended Practice: Lighting Roadway and Parking Facilities
	ANSI/IES RP-9-2020	Recommended Practice: Lighting Hospitality Spaces
	ANSI/IES RP-10-2020	Recommended Practice: Lighting Common Applications
	ANSI/IES RP-11-2020	Recommended Practice: Lighting for Interior and Exterior Residential Environments
	ANSI/IES RP-28-2020	Recommended Practice: Lighting and the Visual Environment for Older Adults and the Visually Impaired
	ANSI/IES RP-29-2020	Recommended Practice: Lighting Hospital and Healthcare Facilities
	ANSI/IES RP-30-2020	Recommended Practice: Lighting Museums
	ANSI/IES RP-38-2017	Recommended Practice: Lighting Performance for Small to Medium Sized Videoconferencing Rooms
	ANSI/IES RP-41-2020	Recommended Practice: Lighting Theaters and Worship Spaces
13.5.2.5.3	IES Lighting Measurements (LM) 83-12	Approved Method: IES Spatial Daylight Autonomy (sDA) and Annual Sunlight Exposure (ASE)
[. . .]		

Modify Table H-3 as shown (I-P and SI).

Table H-3 Standard 90.1 Items to Verify

Subsection	Subsection Title	Standard 90.1 Items to Verify for Proper Operation or Inclusion	Status
[. . .]			
13.5.1	Energy Credits Required	Adequate energy credits are included in the project to meet the requirements of the building type and climate zone.	
13.5.2	Energy Credits Achieved	If applicable, test or commission any items in the proposed building not already covered in Sections 5 through 10 required to achieve the energy efficiency to meet the energy credits required for the building type and climate zone.	
[. . .]			

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted Standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the Standards and Guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive Technical Committee structure, continue to generate up-to-date Standards and Guidelines where appropriate and adopt, recommend, and promote those new and revised Standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date Standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating Standards and Guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.

ASHRAE · 180 Technology Parkway · Peachtree Corners, GA 30092 · www.ashrae.org

About ASHRAE

Founded in 1894, ASHRAE is a global professional society committed to serve humanity by advancing the arts and sciences of heating, ventilation, air conditioning, refrigeration, and their allied fields.

As an industry leader in research, standards writing, publishing, certification, and continuing education, ASHRAE and its members are dedicated to promoting a healthy and sustainable built environment for all, through strategic partnerships with organizations in the HVAC&R community and across related industries.

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