

PROPOSED STRETCH CODE SUPPLEMENT  
AMENDMENTS TO 2018 INTERNATIONAL ENERGY CONSERVATION CODE AND ASHRAE 90.1-2016

New York State Energy Research and Development Authority  
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DRAFT

Prepared with assistance by New Buildings Institute

# PART 1

## Amendments to 2018 International Energy Conservation Code Commercial Provisions

### Addition to Section C202 (General definitions)

**On-site electricity generation systems.** Systems located at the building site that generate electricity, including but not limited to generators, combined heat and power systems, fuel cells, and on-site renewable energy generation systems.

### Amendments to Section C401.2 (Application)

**C401.2 Application.** Commercial buildings shall comply with one of the following compliance paths:

1. ASHRAE Compliance Path (prescriptive): The requirements of ASHRAE 90.1-2016 (as amended) Section 4.2.1.1(a). The building shall also comply with Sections C402.1.3, C402.1.4, C403.7.4, C404.2.2, C405.8.1.1, 405.10, 405.11, C405.12, C406, C408 and C409. Buildings shall comply with Section C406 and tenant spaces shall comply with Section C406.1.1.
2. ASHRAE Compliance Path (Section 11): The requirements of ASHRAE 90.1-2016 (as amended) Section 11 Energy Cost Budget Method. The building shall also comply with Sections C408 and C409.
3. ASHRAE Compliance Path (Appendix g): The requirements of ASHRAE 90.1-2016 (as amended) Appendix G Performance Rating Method. The building shall also comply with Sections C408 and C409.
4. Prescriptive Compliance Path: The requirements of Sections C402 through C406, Sections C408 and C409.

**Amendments to Table C402.1.3 (Opaque thermal envelope insulation component minimum requirements, R-Value method).**

**Table C402.1.3**

**Opaque Thermal Envelope Insulation Component Minimum Requirements, R-Value Method<sup>a, i</sup>**

CLIMATE ZONE	4 EXCEPT MARINE		5 AND MARINE 4		6	
	All other	Group R	All other	Group R	All other	Group R
Roofs						
Insulation Entirely above roof deck	R-35 (U-0.028)	R-35 (U-0.028)	R-35 (U-0.028)	R-35 (U-0.028)	R-35 (U-0.028)	R-35 (U-0.028)
Metal buildings <sup>b</sup>	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS
Attic and other	R-60 (U-0.017)	R-60 (U-0.017)	R-60 (U-0.017)	R-60 (U-0.017)	R-60 (U-0.017)	R-60 (U-0.017)
Walls, above grade						
Mass <sup>g</sup>	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-25ci
Metal building	R-13 + R-13ci	R-13+ R-19.5ci	R-13+ R-19.5ci	R-13+ R-19.5ci	R-13+ R-19.5ci	R-13+ R-19.5ci
Metal framed	R-13 + R-15.6ci	R-13 + R-15.6ci	R-13 + R-15.6ci	R-13 + R-15.6ci	R-13+ R17.5ci	R-13+ R17.5ci
Wood framed and other	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-5ci	R-13 + R-7.5ci or R-20 + R-5ci	R-13 + R-7.5ci or R-20 + R-5ci	R-13 + R-10ci or R-20 + R-6ci
Walls, below grade						
Below-grade wall <sup>d</sup>	R-7.5ci	R-10ci	R-7.5ci	R-10ci	R-10ci	R-15.0ci

Floors						
Mass <sup>e</sup>	R-15ci	R-16.7ci	R-15ci	R-16.7ci	R-16.7ci	R-16.7ci
Joist/framing	R-30	R-30	R-30	R-30	R-38 <sup>g</sup>	R-38 <sup>g</sup>
Slab-on-grade floors						
Unheated slabs	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below
Heated slabs <sup>h</sup>	R-20 for 48" below + R-5 full slab	R-20 for 48" below + R-5 full slab	R-20 for 48" below + R-5 full slab	R-20 for 48" below + R-5 full slab	R-20 for 48" below + R-5 full slab	R-20 for 48" below + R-5 full slab
Opaque doors						
Non-Swinging	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 4.88 kg/m<sup>2</sup>, 1 pound per cubic foot = 16 kg/m<sup>3</sup>.  
ci = Continuous insulation, NR = No Requirement, LS = Liner System.

- Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.
- Where using R-value compliance method, a thermal spacer block shall be provided, otherwise use the U-factor compliance method in Table C402.1.4.
- R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-f<sup>2</sup> °F.
- Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
- "Mass floors" shall be in accordance with Section C402.2.3.
- Steel floor joist systems shall be insulated to R-38.
- "Mass walls" shall be in accordance with Section C402.2.2.
- The first value is for perimeter insulation and the second value is for slab insulation. Perimeter insulation is not required to extend below the bottom of the slab.
- Not applicable to garage doors. See Table C402.1.4.

**Amendments to Table C402.1.4 (Opaque thermal envelope assembly maximum requirements, U-Factor method).**

**Table C402.1.4  
Opaque Thermal Envelope Assembly Maximum Requirements, U-Factor Method<sup>a,b</sup>**

CLIMATE ZONE	4 EXCEPT MARINE		5 AND MARINE 4		6	
	All other	Group R	All other	Group R	All other	Group R
Roofs						
Insulation Entirely above roof deck	U-0.030	U-0.030	U-0.030	U-0.030	U-0.029	U-0.029
Metal buildings	U-0.035	U-0.035	U-0.035	U-0.035	U-0.028	U-0.026
Attic and other	U-0.020	U-0.020	U-0.020	U-0.020	U-0.019	U-0.019
Walls, above grade						
Mass	U-0.099	U-0.086	U-0.086	U-0.076	U-0.076	U-0.067
Metal building	U-0.052	U-0.048	U-0.048	U-0.048	U-0.048	U-0.048
Metal framed	U-0.061	U-0.061	U-0.052	U-0.052	U-0.047	U-0.044
Wood framed and other <sup>c</sup>	U-0.061	U-0.061	U-0.048	U-0.048	U-0.048	U-0.046
Walls, below grade						
Below-grade wall <sup>c</sup>	C-0.119	C-0.092	C-0.119	C-0.092	C-0.092	C0.063

Floors						
Mass <sup>d</sup>	U-0.057	U-0.051	U-0.057	U-0.051	U-0.051	U-0.051
Joist/trimming <sup>h</sup>	U-0.033	U-0.033	U-0.033	U-0.033	U-0.027 <sup>g</sup>	U-0.027 <sup>g</sup>
Slab-on-grade floors						
Unheated slabs	F-0.52	F-0.52	F-0.52	F-0.51	F-0.51	F-0.434
Heated slabs <sup>f</sup>	F-0.65	F-0.65	F-0.65	F-0.65	F-0.58	F-0.58
Opaque doors						
Swinging	U-0.50	U-0.50	U-0.37	U-0.37	U-0.37	U-0.37
Garage door <14% glazing	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 4.88 kg/m<sup>2</sup>, 1 pound per cubic foot = 16 kg/m<sup>3</sup>.

ci = Continuous insulation, NR = No Requirement, LS = Liner System.

- Where assembly *U*-factors, *C*-factors, and *F*-factors are established in ANSI/ASHRAE/IESNA 90.1 Appendix A, such opaque assemblies shall be a compliance alternative where those values meet the criteria of this table, and provided that the construction, excluding the cladding system on walls, complies with the appropriate construction details from ANSI/ASHRAE/IESNA 90.1 Appendix A.
- Where *U*-factors have been established by testing in accordance with ASTM C1363, such opaque assemblies shall be a compliance alternative where those values meet the criteria of this table. The *R*-value of continuous insulation shall be permitted to be added to or subtracted from the original tested design.
- Where heated slabs are below grade, below-grade walls shall comply with the *U*-factor requirements for above-grade mass walls.
- "Mass floors" shall be in accordance with Section C402.2.3.
- These *C*-, *F*- and *U*-factors are based on assemblies that are not required to contain insulation.
- The first value is for perimeter insulation and the second value is for full slab insulation.
- "Mass walls" shall be in accordance with Section C402.2.2.
- Steel floor joist systems shall be insulated to U-0.032.

#### **Amendments to Section C402.2 (Specific building thermal envelope insulation requirements (Prescriptive))**

**C402.2 Specific building thermal envelope insulation requirements (Prescriptive).** Insulation in building thermal envelope opaque assemblies shall comply with Sections C402.2.1 through C402.2.8 and Table C402.1.3.

#### **Addition of new Section C402.2.8 (Continuous insulation).**

**C402.2.8 Continuous insulation.** In new construction, no opaque portions of the building thermal envelope shall have an R-Value of less than 5.

**Exception:** Opaque doors.

#### **Amendments to Section C402.4 (Fenestration (Prescriptive))**

**C402.4 Fenestration (Prescriptive).** Fenestration shall comply with Sections C402.4.1 through C402.4.6 and Table C402.4. Daylight responsive controls shall comply with this section and Section C405.2.3.1.

#### **Addition of new Section C402.4.6 (Thermal breaks).**

**C402.4.6 Thermal breaks.** A thermal break with a minimum R-value of 3.8 shall be installed between window frames and opaque elements of the building structure.

**Amendments to Table C402.4 (Building envelope fenestration maximum U-factor and SHGC requirements)**

**Table C402.4  
Building Envelope Fenestration Maximum U-Factor and SHGC Requirements**

CLIMATE ZONE	4	5	6
<b>Vertical Fenestration</b>			
<b>U-Factor</b>			
Windows rated in accordance with AAMA/WDMA/CSA 101/I.S/A440 <sup>A</sup> (Class AW windows) and curtain walls			
Fixed fenestration	0.36	0.36	0.34
Operable fenestration	0.43	0.43	0.41
All other vertical fenestration			
All fenestration	0.30	0.27	0.27
Entrance doors	0.77	0.77	0.77
<b>SHGC</b>			
PF < 0.2		0.35	
0.2 ≤ PF < 0.5		0.35	
PF ≥ 0.5		0.35	
<b>Skylights</b>			
U-Factor	0.48	0.48	0.48
SHGC	0.38	0.38	0.38
<sup>A</sup> Curtain wall, window wall, and storefront fenestration shall comply with the U-factor and SHGC requirements for Class AW fixed windows.			

**Amendments to Section C402.5 (Air leakage--thermal envelope (Mandatory))**

**C402.5 Air leakage--thermal envelope (Mandatory).** The thermal envelope of additions and alterations shall comply with Sections C402.5.1 through C402.5.8. The thermal envelope of new buildings shall comply with Section C402.5.9, or shall comply with Sections C402.5.1 through C402.5.8 and C408.4.

**Exception:**

New buildings not less than 25,000 square feet and not greater than 50,000 square feet, and less than or equal to 75 feet in height, must show compliance through testing in accordance with Section C402.5.1.

**Addition of New Section C402.5.9. (Air Barrier Testing)**

**C402.5.9 Air Barrier Testing.** The building thermal envelope shall be tested in accordance with ASTM E779 at a pressure differential of 0.3 inch water gauge (75 Pa) or an equivalent method approved by the code official and deemed to comply with the provisions of this section when the tested air leakage rate of the building thermal envelope is not greater than 0.40 cfm/ft<sup>2</sup> (2.0 L/s \* m<sup>2</sup>). Where the compliance is based on such testing, the building shall also comply with Sections C402.5.5, C402.5.6, and C402.5.7.

**Amendments to Section C403.7.4 (Energy recovery ventilation systems (Mandatory))**

**C403.7.4 Energy recovery ventilation systems (Mandatory).** Where the supply airflow rate of a fan system exceeds the values specified in Table C403.7.4 (1) and C403.7.4 (2), the system shall include an energy recovery ventilation system. The energy recovery ventilation system shall be configured to provide a change in the enthalpy of the outdoor air supply of not less than 50 percent of the difference between the outdoor air and return air enthalpies, at design conditions. Where an air economizer is required, the energy recovery ventilation system shall include a bypass or controls that permit operation of the economizer as required by Section C403.5.

**Exception:** An energy recovery ventilation system shall not be required in any of the following conditions:

1. Where energy recovery systems are prohibited by the International Mechanical Code.
2. Laboratory fume hood systems that include not fewer than one of the following features:
  - 2.2. Variable-air-volume hood exhaust and room supply systems configured to reduce exhaust and makeup air volume to 50 percent or less of design values.
  - 2.3. Direct makeup (auxiliary) air supply equal to or greater than 75 percent of the exhaust rate, heated not warmer than 2°F (1.1°C) above room setpoint, cooled to not cooler than 3°F (1.7°C) below room setpoint, with no humidification added, and no simultaneous heating and cooling used for dehumidification control.
3. Systems serving spaces that are heated to less than 60°F (15.5°C) and that are not cooled.
4. Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site-solar energy.
5. Heating energy recovery in Climate Zones 1 and 2.
6. Cooling energy recovery in Climate Zones 3C, 4C, 5B, 5C, 6B, 7 and 8.
7. Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
8. In new buildings, where the largest source of air exhausted at a single location at the building exterior is less than 75 percent of the design ventilation outdoor air flow rate, multiple exhaust fans or outlets located within a 30 foot radius from the outdoor air supply unit shall be considered a single exhaust location.
9. Systems expected to operate less than 20 hours per week at the outdoor air percentage covered by Table C403.7.4(1).
10. Systems exhausting toxic, flammable, paint or corrosive fumes or dust.
11. Commercial kitchen hoods used for collecting and removing grease vapors and smoke.

#### **Amendments to Section C403.8.1 (Allowable fan horsepower)**

**C403.8.1 Allowable fan horsepower (Mandatory).** In new construction, each HVAC system having a total fan system motor nameplate horsepower exceeding 5 hp (3.7 kW) at fan system design conditions shall not exceed the allowable fan power (option 1) or *fan system bhp* (option 2) shown in Table C403.8.1(1). This includes supply fans, exhaust fans, return/relief fans, and fan-powered terminal units associated with systems providing heating or cooling capability. Single-zone variable air volume systems shall comply with the constant volume fan power limitation.

#### **Exceptions:**

1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.
2. Individual exhaust fans with motor nameplate horsepower of 1 hp (0.746 kW) or less are exempt from the allowable fan horsepower requirement.

**Amendments to Table C403.8.1(1) (Fan Power Limitation).**

**Table C403.8.1(1)  
Fan Power Limitation**

	Limit	Constant volume	Variable volume
Option 1: Fan power	Allowable fan power	Watts $\leq$ CFMs*0.65	Watts $\leq$ CFMs* 0.8
Option 2: Fan system bhp	Allowable fan system bhp	bhp $\leq$ CFM <sub>s</sub> X 0.00094 + A	bhp $\leq$ CFM <sub>s</sub> X 0.0013 + A

For SI: 1 bhp = 735.5 W, 1 hp = 745.5 W, 1 cfm = 0.4719 L/S  
Where:  
CFM<sub>x</sub> = CFM delivered  
CFM<sub>s</sub> = The maximum design supply airflow rate to conditioned spaces served by the system in cubic feet per minute.  
hp = The maximum combined motor nameplate horsepower.  
bhp = The maximum combined fan brake horsepower.  
A = Sum of [PD X CFM<sub>D</sub>/4131]  
Where:  
PD = Each applicable pressure drop adjustment from Table C403.8.1 (2) in. w.c.  
CFM<sub>D</sub> = The design airflow through each applicable device from Table C403.8.1(2) in cubic feet per minute.

**Addition of new Section C404.2.2 (Service water system efficiency)**

**C404.2.2 Service water system efficiency.** In new buildings, not less than 40% of the annual service water-heating requirement serving residential occupancies, commercial kitchens and laundries shall be provided by on-site renewable energy or site-recovered energy.

**Amendments to Section C405.2.1 (Occupant sensor controls).**

**C405.2.1 Occupant sensor controls.** Occupant sensor controls shall be installed to control lights in the following space types:

1. Classrooms/lecture/training rooms.
2. Conference/meeting/multipurpose rooms.
3. Copy/print rooms.
4. Corridor/transition areas.
5. Dining areas.
6. Lounges/breakrooms.
7. Enclosed offices.
8. Open plan office areas.
9. Restrooms.
10. Storage rooms.
11. Locker rooms.
12. Other spaces 300 square feet (28 m<sup>2</sup>) or less that are enclosed by floor-to-ceiling height partitions.
13. Warehouse storage areas.

**Addition of new Section C405.2.1.4 (Occupant sensor control function for egress illumination).**

**C405.2.1.4 Occupant sensor control function for egress illumination.** In new buildings, luminaires serving the exit access and providing means of egress illumination required by Section 1006.1 of the *International Building Code*, including luminaires that function as both normal and emergency means of egress illumination shall be controlled by a combination of

listed emergency relay and occupancy sensors, or signal from another building control system, that automatically shuts off the lighting when the areas served by that illumination are unoccupied.

**Exception:** Means of egress illumination serving the exit access that does not exceed 0.02 watts per square foot of building area is exempt from this requirement.

### Amendments to Section C405.2.3 (Daylight responsive controls)

**C405.2.3 Daylight responsive controls.** *Daylight-responsive controls* complying with Section C405.2.3.1 shall be provided to control the electric lights within *daylight zones* in the following spaces:

1. Spaces with a total of more than 100 watts of *general lighting* within sidelit zones complying with Section C405.2.3.2. *General lighting* does not include lighting that is required to have specific application control in accordance with Section C405.2.4.
2. Spaces with a total of more than 100 watts of *general lighting* within toplit zones complying with Section C405.2.3.3.

**Exceptions:** Daylight responsive controls are not required for the following:

1. Spaces in health care facilities where patient care is directly provided.
2. Lighting that is required to have specific application control in accordance with Section C405.2.4.
3. Sidelit zones on the first floor above grade in Group A-3 and Group M occupancies.
4. New buildings where the total connected lighting power calculated in accordance with Section C405.3.1 is not greater than the adjusted interior lighting power allowance ( $LPA_{adj}$ ) calculated in accordance with Equation 4-9:

$$LPA_{adj} = [LPA_{norm} \times (1.0 - 0.4 \times UDZFA / TBFA)]$$

**(Equation 4-9)**

Where:

$LPA_{adj}$  = Adjusted building interior lighting power allowance in watts.

$LPA_{norm}$  = Normal building lighting power allowance in watts calculated in accordance with Section C405.3.2 and reduced in accordance with Section C406.3 where Option 2 of Section C406.1 is used to comply with the requirements of Section C406.

UDZFA = Uncontrolled daylight zone floor area is the sum of all sidelit and toplit zones, calculated in accordance with Sections C405.2.3.2 and C405.2.3.3, that do not have daylight responsive controls.

TBFA = Total building floor area is the sum of all floor areas included in the lighting power allowance calculation in Section C405.3.2.

### Amendment to Section C405.2.3.2 (Sidelit Zone)

**C405.2.3.2 Sidelit zone.** The sidelit zone is the floor area adjacent to vertical *fenestration* that complies with all of the following:

1. Where the fenestration is located in a wall, the sidelit zone shall extend laterally to the nearest full-height wall, or up to 1.0 times the height from the floor to the top of the fenestration, and longitudinally from the edge of the fenestration to the nearest full-height wall, or up to 2 feet (610 mm), whichever is less, as indicated in Figure C405.2.3.2.



2. The area of the fenestration is not less than 24 square feet (2.23 m<sup>2</sup>).
3. The distance from the fenestration to any building or geological formation that would block access to daylight is greater than one-half of the height from the bottom of the fenestration to the top of the building or geologic formation.
4. The visible transmittance of the fenestration is not less than 0.20.

**Amendments to Section C405.2.6 (Exterior lighting controls).**

**C405.2.6 Exterior lighting controls.** Exterior lighting systems shall be provided with controls that comply with Sections C405.2.6.1 through C405.2.6.5. Decorative lighting systems shall comply with Sections C405.2.6.1, C405.2.6.2 and C405.2.6.4.

**Exceptions:**

1. Lighting for covered vehicle entrances and exits from buildings and parking structures where required for eye adaptation.
2. Lighting controlled from within dwelling units.

**Addition of new Section C405.2.6.5 (Outdoor parking area lighting control).**

**C405.2.6.5 Outdoor parking area lighting control.** Outdoor parking area luminaires mounted 24' or less above the ground shall be controlled to automatically reduce the power of each luminaire by a minimum of 50% when no activity has been detected for at least 15 minutes.

**Exception:** Outdoor parking areas with less than 1,000 watts of lighting.

**Amendments to Table C405.3.2(1) (Interior lighting power allowances: building area method)**

**TABLE C405.3.2(1)  
Interior Lighting Power Allowances: Building Area Method**

BUILDING AREA TYPE	LPD (w/ft <sup>2</sup> )
Automotive facility	0.64
Convention center	0.51
Courthouse	0.74
Dining: bar lounge/leisure	0.69
Dining: cafeteria/fast food	0.66
Dining: family	0.61
Dormitory <sup>a, b</sup>	0.52
Exercise center	0.61
Fire station <sup>a</sup>	0.50
Gymnasium	0.67
Health care clinic	0.68
Hospital <sup>a</sup>	0.86
Hotel/motel <sup>a, b</sup>	0.70
Library	0.72
Manufacturing facility	0.60
Motion picture theater	0.62

Multifamily <sup>c</sup>	0.49
Museum	0.68
Office	0.69
Parking garage	0.12
Penitentiary	0.67
Performing arts theater	0.85
Police station	0.68
Post office	0.62
Religious building	0.70
Retail	0.91
School/university	0.67
Sports arena	0.76
Town hall	0.72
Transportation	0.51
Warehouse	0.41
Workshop	0.83
<p>a. Where sleeping units are excluded from lighting power calculations by application of Section R405.1, neither the area of the sleeping units nor the wattage of lighting in the sleeping units is counted.</p> <p>b. Where dwelling units are excluded from lighting power calculations by application of R404.1, neither the area of the dwelling units nor the wattage of lighting in the dwelling units is counted.</p> <p>c. Dwelling units are excluded. Neither the area of the dwelling units nor the wattage of lighting in the dwelling units is counted.</p>	

**Amendments to Table C405.3.2(2) (Interior lighting power allowances: Space-by-space method).**

**Table C405.3.2(2)  
Interior Lighting Power Allowances: Space-by-Space Method**

COMMON SPACE TYPES <sup>a</sup>	LPD (w/ft <sup>2</sup> )
Atrium	
Less than 40 feet in height	0.023 per foot in total height
Greater than 40 feet in height	0.30 + 0.015 per foot in total height
Audience seating area	
In an auditorium	0.63
In a convention center	0.65
In a gymnasium	0.43

COMMON SPACE TYPES <sup>a</sup>	LPD (w/ft <sup>2</sup> )
In a motion picture theater	0.64
In a penitentiary	0.28
In a performing arts theater	1.34
In a religious building	0.98
In a sports arena	0.42
Otherwise	0.40
Banking activity area	0.79
Breakroom (See Lounge/Breakroom)	
Classroom/lecture hall/training room	
In a penitentiary	1.06
Otherwise	0.74
Computer room	1.16
Conference/meeting/multipurpose room	0.93
Confinement cells	0.52
Copy/print room	0.50
Corridor	
In a facility for the visually impaired (and not used primarily by the staff) <sup>b</sup>	0.81
In a hospital	0.81
In a manufacturing facility	0.28
Otherwise	0.58
Courtroom	0.98
Dining area	
In bar/lounge or leisure dining	0.62
In cafeteria or fast food dining	0.53
In a facility for the visually impaired (and not used primarily by the staff) <sup>b</sup>	1.48
In family dining	0.54
In a penitentiary	0.72
Otherwise	0.53
Electrical/mechanical room	0.39
Emergency vehicle garage	0.41
Food preparation area	0.92
Guestroom <sup>c, d</sup>	0.75
Laboratory	
In or as a classroom	1.04
Otherwise	1.24
Laundry/washing area	0.43
Loading dock, interior	0.51
Lobby	

<b>COMMON SPACE TYPES <sup>a</sup></b>	<b>LPD (w/ft<sup>2</sup>)</b>
For an elevator	0.52
In a facility for the visually impaired (and not used primarily by the staff) <sup>b</sup>	1.30
In a hotel	0.68
In a motion picture theater	0.38
In a performing arts theater	0.82
Otherwise	0.86
Locker room	0.45
Lounge/breakroom	
In a healthcare facility	0.53
Otherwise	0.44
Office	
Enclosed	0.85
Open plan	0.78
Parking area, interior	0.11
Pharmacy area	1.23
Restroom	
In a facility for the visually impaired (and not used primarily by the staff) <sup>b</sup>	0.81
Otherwise	0.75
Sales area	1.06
Seating area, general	0.38
Stairway (See space containing stairway)	
Stairwell	0.50
Storage room	0.43
Vehicular maintenance area	0.53
Workshop	1.09

<b>BUILDING TYPE SPECIFIC SPACE TYPES <sup>a</sup></b>	<b>LPD (w/ft<sup>2</sup>)</b>
Automotive (See Vehicular Maintenance Area above)	
Convention Center—exhibit space	0.69
Dormitory—living quarters <sup>c, d</sup>	0.46
Facility for the visually impaired <sup>b</sup>	
In a chapel (and not used primarily by the staff)	0.89
In a recreation room (and not used primarily by the staff)	1.53
Fire Station—sleeping quarters <sup>c</sup>	0.19
Gymnasium/fitness center	
In an exercise area	0.50
In a playing area	0.75

BUILDING TYPE SPECIFIC SPACE TYPES <sup>a</sup>	LPD (w/ft <sup>2</sup> )
Healthcare facility	
In an exam/treatment room	1.16
In an imaging room	0.98
In a medical supply room	0.54
In a nursery	0.94
In a nurse's station	0.75
In an operating room	1.87
In a patient room <sup>c</sup>	0.45
In a physical therapy room	0.84
In a recovery room	0.89
Library	
In a reading area	0.77
In the stacks	1.08
Manufacturing facility	
In a detailed manufacturing area	0.86
In an equipment room	0.61
In an extra-high-bay area (greater than 50' floor-to-ceiling height)	0.73
In a high-bay area (25-50' floor-to-ceiling height)	0.58
In a low-bay area (less than 25' floor-to-ceiling height)	0.61
Museum	
In a general exhibition area	0.61
In a restoration room	0.77
Performing arts theater—dressing room	0.35
Post Office—Sorting Area	0.66
Religious buildings	
In a fellowship hall	0.42
In a worship/pulpit/choir area	0.98
Retail facilities	
In a dressing/fitting room	0.49
In a mall concourse	0.79
Sports arena—playing area	
For a Class I facility <sup>e</sup>	2.26
For a Class II facility <sup>f</sup>	1.45
For a Class III facility <sup>g</sup>	1.08
For a Class IV facility <sup>h</sup>	0.72
Transportation facility	
In a baggage/carousel area	0.40
In an airport concourse	0.22
At a terminal ticket counter	0.48
Warehouse—storage area	

BUILDING TYPE SPECIFIC SPACE TYPES <sup>a</sup>	LPD (w/ft <sup>2</sup> )
For medium to bulky, palletized items	0.27
For smaller, hand-carried items	0.65
<p>a. In cases where both a common space type and a building area specific space are listed, the building area specific space type shall apply.</p> <p>b. A 'Facility for the Visually Impaired' is a facility that is licensed or will be licensed by local or state authorities for senior long-term care, adult daycare, senior support or people with special visual needs.</p> <p>c. Where sleeping units are excluded from lighting power calculations by application of Section R404.1, neither the area of the sleeping units nor the wattage of lighting in the sleeping units is counted.</p> <p>d. Where dwelling units are excluded from lighting power calculations by application of R404.1, neither the area of the dwelling units nor the wattage of lighting in the dwelling units is counted.</p> <p>e. Class I facilities consist of Professional facilities; and Semi-professional, Collegiate, or Club facilities with seating for 5,000 or more spectators.</p> <p>f. Class II facilities consist of Collegiate and Semi-professional facilities with seating for fewer than 5,000 spectators; Club facilities with seating for between 2,000 and 5,000 spectators; and Amateur League and High School facilities with seating for more than 2,000 spectators.</p> <p>g. Class III facilities consist of Club, Amateur League, and High School facilities with seating for 2,000 or fewer spectators.</p> <p>h. Class IV facilities consist of Elementary School and Recreational facilities, and Amateur League and High School facilities without provisions for spectators.</p>	

For SI: 1 foot = 304.8 mm, 1 watt per square foot = 1 W/0.0929 m<sup>2</sup>.

**Amendments to Table C405.4.2(2) (Lighting power allowances for building exteriors).**

**Table C405.4.2(2)  
Lighting Power Allowances for Building Exteriors**

	LIGHTING ZONES			
	Zone 1	Zone 2	Zone 3	Zone 4
Base Site Allowance	350 W	400 W	500 W	900 W
<b>Uncovered Parking Areas</b>				
Parking areas and drives	0.03 W/ft <sup>2</sup>	0.03 W/ft <sup>2</sup>	0.05 W/ft <sup>2</sup>	0.05 W/ft <sup>2</sup>
<b>Building Grounds</b>				
Walkways and ramps less than 10 feet wide	0.5 W/linear foot	0.5 W/linear foot	0.6 W/linear foot	0.7 W/linear foot
Walkways and ramps 10 feet wide or greater, plaza areas special feature areas	0.10 W/ft <sup>2</sup>	0.10 W/ft <sup>2</sup>	0.11 W/ft <sup>2</sup>	0.14 W/ft <sup>2</sup>
Dining areas	0.65 W/ft <sup>2</sup>	0.65 W/ft <sup>2</sup>	0.75 W/ft <sup>2</sup>	0.95 W/ft <sup>2</sup>

Stairways	0.6 W/ft <sup>2</sup>	0.7 W/ft <sup>2</sup>	0.7 W/ft <sup>2</sup>	0.7 W/ft <sup>2</sup>
Pedestrian tunnels	0.12 W/ft <sup>2</sup>	0.12 W/ft <sup>2</sup>	0.14 W/ft <sup>2</sup>	0.21 W/ft <sup>2</sup>
Landscaping	0.03 W/ft <sup>2</sup>	0.04 W/ft <sup>2</sup>	0.04 W/ft <sup>2</sup>	0.04 W/ft <sup>2</sup>
<b>Building Entrances and Exits</b>				
Pedestrian and vehicular entrances and exits	12.6 W/linear foot of opening width	12.6 W/linear foot of opening width	20 W/linear foot of opening width	20 W/linear foot of opening width
Entry canopies	0.2 W/ft <sup>2</sup>	0.25 W/ft <sup>2</sup>	0.4 W/ft <sup>2</sup>	0.4 W/ft <sup>2</sup>
Loading docks	0.35 W/ft <sup>2</sup>	0.35 W/ft <sup>2</sup>	0.35 W/ft <sup>2</sup>	0.35 W/ft <sup>2</sup>
<b>Sales Canopies</b>				
Free-standing and attached	0.4 W/ft <sup>2</sup>	0.4 W/ft <sup>2</sup>	0.6 W/ft <sup>2</sup>	0.7 W/ft <sup>2</sup>
<b>Outdoor Sales</b>				
Open areas (including vehicle sales lots)	0.2 W/ft <sup>2</sup>	0.2 W/ft <sup>2</sup>	0.35 W/ft <sup>2</sup>	0.5 W/ft <sup>2</sup>
Street frontage for vehicle sales lots in addition to "open area" allowance	No allowance	7 W/linear foot	7 W/linear foot	21 W/linear foot

For SI: 1 foot = 304.8 mm, 1 watt per square foot = 1 W/0.0929 m<sup>2</sup>.

W = watts

#### Addition of new Section C405.8.1.1 (Power conversion system)

**C405.8.1.1 Power conversion system.** New traction elevators in new buildings and existing elevator shafts shall have a power conversion system that complies with Sections 405.8.1.1.1 through 405.8.1.1.3.

**C405.8.1.1.1 Motor.** Induction motors with a Class IE2 efficiency ratings, as defined by IEC EN 60034-30, or alternative technologies, such as permanent magnet synchronous motors that have equal or better efficiency, shall be used.

**C405.8.1.1.2 Transmission.** Transmissions shall not reduce the efficiency of the combined motor/transmission below that shown for the Class IE2 motor. Gearless machines shall be assumed to have a 100 percent transmission efficiency.

**C405.8.1.1.3 Drive.** Potential energy released during motion shall be recovered with a regenerative drive that supplies electrical energy to the building electrical system.

#### Addition of new Section C405.10 (Automatic receptacle controls).

**C405.10 Automatic receptacle controls.** The following receptacles shall be automatically controlled in accordance with Section C405.10.1:

1. At least 50% of all 125 V, 15 and 20 amp receptacles in all private offices, conference rooms, rooms used primarily for printing and/or copying functions, break rooms, classrooms, and individual workstations.

2. At least 25% of branch circuit feeders installed for modular furniture not shown on the construction documents.

All controlled receptacles shall be permanently marked to visually differentiate them from uncontrolled receptacles and are to be uniformly distributed throughout the space. Plug-in devices shall not be used to comply with Section C405.10.1.

**Exceptions:**

1. Receptacles specifically designated for equipment intended for continuous operation (24 hours/day, 365 days/year).
2. Spaces where an automatic shutoff would endanger occupant safety or security.

**C405.10.1 Automatic receptacle control function.** Automatic receptacle controls shall comply with one of the following:

1. Automatically turn receptacles off at specific programmed times, and the occupant shall be able to manually override the control device for up to two hours. An independent program schedule shall be provided for controlled areas of not more than 5000 square feet and not more than one floor.
2. Be an occupant sensor to automatically turn receptacles off within 20 minutes of all occupants leaving a space.
3. Be an automated signal from another control or alarm system to automatically turn receptacles off within 20 minutes of all occupants leaving a space.

**Addition of new Section C405.11 (Commercial Kitchen Equipment)**

**C405.11 Commercial Kitchen Equipment.** The following equipment within the scope of the applicable Energy Star program shall comply with the equivalent criteria required to achieve the Energy Star label if installed prior to the issuance of the Certificate of Occupancy:

1. Commercial Fryers
2. Commercial Hot Food Holding Cabinets
3. Commercial Steam Cookers
4. Commercial Dishwashers
5. Commercial Griddles
6. Commercial Ovens

**Addition of new Section C405.12 (Electric vehicle charging station capable)**

**C405.12 Electric vehicle charging station capable.** New parking garages and new parking lots shall provide either:

1. Minimum 208/240V 40 amp charging outlets for 5 percent of the total parking spaces and not less than 1 parking space; or
2. Panel capacity and conduit for the future installation of such outlets for 5 percent of the total parking spaces and not less than 1 parking space.

**Addition of new Section C405.13 (Solar-ready zone)**

**C405.13 Solar-ready zone (Mandatory).** Comply with the provisions of Appendix CA.



### **Addition of Section C405.14 (Whole building energy monitoring)**

**C405.14 Whole building energy monitoring.** Measurement devices shall be installed in new buildings to monitor energy use of the following types of energy supplied by a utility, energy provider, or plant that is not within the building:

1. Natural gas
2. Fuel oil
3. Propane
4. Steam
5. Chilled Water
6. Hot Water

The energy use of each building on the building site shall be recorded at a minimum of every 60 minutes and reported at least hourly, daily, monthly and annually; the recorded data shall be retained for not less than 36 months; and user reports shall be created showing at least hourly, daily, monthly and annual energy consumption and demand.

#### **Exceptions:**

1. Buildings or additions less than 25,000 square feet (2,325 m<sup>2</sup>).
2. Residential buildings with less than 10,000 square feet of common area (930 m<sup>2</sup>).
3. Fuel use for on-site emergency equipment.

### **Replacement of Section C406.1 (Requirements)**

**C406.1 Requirements.** Buildings shall comply with at least one of the following Sections.

1. More efficient HVAC equipment in accordance with Section C406.2.
2. Reduced lighting power in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. Dedicated outdoor air systems with energy recovery ventilation in accordance with Section C406.5.
5. Enhanced envelope performance in accordance with Section C406.6.
6. Reduced air infiltration in accordance with Section C406.7.

#### **Amendment to Section C406.1.1 (Tenant Spaces).**

**C406.1.1. Tenant spaces.** Tenant spaces shall comply with Section C406.2, C406.3, C406.4 or C406.7. Alternatively, tenant spaces shall be in compliance with Section C406.5 or C406.6 where the entire building is in compliance.

**Exception:** Previously occupied tenant spaces that comply with this code using Section C501.

#### **Amendment to Section C406.2 (More efficient HVAC equipment performance).**

**C406.2 More efficient HVAC equipment performance.** HVAC equipment shall meet or exceed the minimum efficiency requirements of Tables C406.2(1) through C406(9).

Addition of new TABLE C406.2(1) (Minimum efficiency requirements: Unitary air conditioners).

**Table C406.2(1)**  
**Minimum Efficiency Requirements: Unitary Air-Conditioners**

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE <sup>a</sup>
Air Conditioners, Air Cooled (Cooling Mode)	<65,000 Btu/h	All	Split System	16 SEER 13 EER	AHRI 210/240
			Single Package	16 SEER 12 EER	
	≥65,000 Btu/h and <135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.2 EER 14 IEER	AHRI 340/360
			All Other	12 EER 13.8 IEER	
	≥135,000 Btu/h and <240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.2 EER 13.2 IEER	
			All Other	12 EER 13 IEER	
	≥240,000 Btu/h and <760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.8 EER 12.3 IEER	
			All Other	10.6 EER 12.1 IEER	
	≥760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.4 EER 11.6 IEER	
			All Other	10.2 EER 11.4 IEER	
Air Conditioners, Water Cooled	<65,000 Btu/h	All	Split System and Single Package	14 EER 15.3 IEER	AHRI 210/240
	≥65,000 Btu/h and <135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	14 EER 15.3 IEER	AHRI 340/360
			All Other	13.8 EER 15.1 IEER	
	≥135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	14 EER 14.8 IEER	
			All Other	13.8 EER 14.6 IEER	
Air Conditioners, Evaporatively Cooled	<65,000 Btu/h	All	Split System and Single Package	14 EER 15.3 IEER	
	≥65,000 Btu/h and <135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	14 EER 15.3 IEER	AHRI 340/360
			All Other	13.8 EER 15.1 IEER	
≥135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	14 EER 14.8 IEER		

		All Other	Split System and Single Package	13.8 EER 14.6 IEER	
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- a. Chapter 6 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

**Addition of new Table C406.2(2) (Minimum efficiency requirements: Unitary heat pumps).**

**Table C406.2(2)  
Minimum Efficiency Requirements: Unitary Heat Pumps**

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE <sup>a</sup>
Air Cooled (Cooling Mode)	<65,000 Btu/h	All	Split System	16 SEER 13 EER	AHRI 210/240
			Single Package	16 SEER 12 EER	
	≥65,000 Btu/h and <135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.8 EER 13.6 IEER	AHRI 340/360
		All Other	Split System and Single Package	11.6 EER 13.4 IEER	
	≥135,000 Btu/h and <240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.9 EER 11.9 IEER	
		All Other	Split System and Single Package	10.7 EER 11.7 IEER	
	≥240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.3 EER 10.9 IEER	
		All Other	Split System and Single Package	10.1 EER 10.7 IEER	
Air Cooled (Heating Mode)	<65,000 Btu/h	-	Split System	9 HSPF	AHRI 210/240
		-	Single Package	8.5 HSPF	
	≥65,000 Btu/h and <135,000 Btu/h	-	47°F db/43°F wb Outdoor Air	3.4 COP	AHRI 340/360
		-	17°F db/15°F wb Outdoor Air	2.4 COP	
	≥135,000 Btu/h	-	47°F db/43°F wb Outdoor Air	3.2 COP	
		-	17°F db/15°F wb Outdoor Air	2.1 COP	
Water Source (Cooling Mode)	<135,000 Btu/h	All	86°F Entering Water	14 EER	ISO-13256-1
Water Source (Heating Mode)	<135,000 Btu/h	-	68°F Entering Water	4.6 COP	ISO-13256-1

- a. Chapter 6 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

**Addition of new Table C406.2(3) (Minimum efficiency requirements: variable refrigerant flow multisplit air-conditioners)**

**Table C406.2(3)**

**Minimum Efficiency Requirements: Variable Refrigerant Flow Multisplit Air-Conditioners**

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE <sup>a</sup>
VRF Air Cooled (Cooling Mode)	<65,000 Btu/h	All	Multisplit System	16 SEER 13 EER	AHRI 1230
	≥65,000 Btu/h and <135,000 Btu/h	Electric Resistance (or None)	Multisplit System	11.7 EER 14.9 IEER	
	≥135,000 Btu/h and <240,000 Btu/h	Electric Resistance (or None)	Multisplit System	11.7 EER 14.4 IEER	
	≥240,000 Btu/h	Electric Resistance (or None)	Multisplit System	10.5 EER 13 IEER	

- a. Chapter 6 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

**Addition of new Table C406.2(4) (Minimum efficiency requirements: variable refrigerant flow multisplit heat pumps).**

**Table C406.2(4)**

**Minimum Efficiency Requirements: Variable Refrigerant flow Multisplit Heat Pumps**

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE <sup>a</sup>
VRF Air Cooled (Cooling Mode)	<65,000 Btu/h	All	Multisplit System	16 SEER 13 EER	AHRI 1230
	≥65,000 Btu/h and <135,000 Btu/h	Electric Resistance (or None)	Multisplit System	11.3 EER 14.6 IEER	
			Multisplit System with Heat Recovery	11.1 EER 14.4 IEER	
	≥135,000 Btu/h and <240,000 Btu/h	Electric Resistance (or None)	Multisplit System	10.9 EER 13.9 IEER	
			Multisplit System with Heat Recovery	10.7 EER 13.7 IEER	
	≥240,000 Btu/h	Electric Resistance (or None)	Multisplit System	10.3 EER 12.7 IEER	
			Multisplit System with Heat Recovery	10.1 EER 12.5 IEER	
	VRF Air Cooled (Heating Mode)	<65,000 Btu/h	-	Multisplit System	
≥65,000 Btu/h and <135,000 Btu/h		-	47°F db/43°F wb Outdoor Air	3.4 COP	
			17°F db/15°F wb Outdoor Air	2.4 COP	
≥135,000 Btu/h	-	47°F db/43°F wb Outdoor Air	3.2 COP		

			17°F db/15°F wb Outdoor Air	2.1 COP
VRF Water Source (Cooling Mode)	<135,000 Btu/h	All	Multisplit System 86°F Entering Water	14 EER 16 IEER
			Multisplit System with Heat Recovery 86°F Entering Water	13.8 EER 15.8 IEER
	≥135,000 Btu/h		Multisplit System 86°F Entering Water	11.6 EER 14 IEER
			Multisplit System with Heat Recovery 86°F Entering Water	11.2 EER 13.8 IEER
VRF Water Source (Heating Mode)	<135,000 Btu/h	-	68°F Entering Water	4.6 COP
	≥135,000 Btu/h		68°F Entering Water	4.2 COP

- a. Chapter 6 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

**Addition of new Table C406.2(5) (Minimum efficiency requirements: Electrically operated single-packaged vertical air conditioners and single-packaged vertical heat pumps air-conditioner heat pumps).**

**Table C406.2(5)**

**Minimum efficiency requirements: Electrically operated single-packaged vertical air conditioners and single-packaged vertical heat pumps air-conditioner heat pumps**

EQUIPMENT TYPE	SIZE CATEGORY	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE <sup>a</sup>
PTAC (cooling mode) standard size	All capacities	95°F db outdoor air	14.4 – (0.300 x Cap/1000) <sup>c</sup> EER	AHRI 310/380
PTAC (cooling mode) nonstandard size	All capacities	95°F db outdoor air	10.9 – (0.213 x Cap/1000) <sup>c</sup> EER	
PTHP (cooling mode) standard size	All capacities	95°F db outdoor air	14.4 – (0.300 x Cap/1000) <sup>c</sup> EER	ARI 310/380
PTHP (cooling mode) nonstandard size	<7000 Bth/h	95°F db outdoor air	10.8 – (0.213 x Cap/1000) <sup>c</sup> EER	
PTHP (heating mode) new constructions	All capacities	47°F db/43°F wb outdoor air	3.7 – (0.052 x Cap/1000) <sup>c</sup> COP <sub>H</sub>	
PTHP (heating mode) nonstandard size <sup>b</sup>	All capacities	47°F db/43°F wb outdoor air	2.9 – (0.026 x Cap/1000) <sup>c</sup> COP <sub>H</sub>	

- a. Chapter 6 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.
- b. Replacement units shall be factory labeled as follow: “MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEW CONSTRUCTION PROJECTS”. Replacement efficiencies apply only to units with existing sleeves less than 16 in. high and less than 42 in. wide and having a cross-sectional area less than 670 in.<sup>2</sup>.

- c. “Cap” means rated cooling capacity of the product in Btu/h. If the unit’s capacity is less than 7000 Btu/h, use 7000 in the calculation. If the unit’s capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculation.

**Addition of new Table C406.2(6) (Minimum efficiency requirements: Single-packaged vertical air conditioners, single-packaged vertical heat pumps, room air conditioners, and room air-conditioner heat pumps).**

**Table C406.2(6)**

**Minimum efficiency requirements: Single-packaged vertical air conditioners, single-packaged vertical heat pumps, room air conditioners, and room air-conditioner heat pumps**

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY BASE	MINIMUM EFFICIENCY CONNECTED <sup>b</sup>	TEST PROCEDURE <sup>a</sup>
SPVAC (cooling mode)	<65,000 Btu/h	95°F db/75°F wb outdoor air	14 SEER		AHRI 210/240
	≥65,000 Btu/h and <135,000 Btu/h	95°F db/75°F wb outdoor air	11.2 EER 12.9 IEER		AHRI 340/360
	≥135,000 Btu/h and <240,000 Btu/h	95°F db/75°F wb outdoor air	11 EER 12.4 IEER		
SPVHP (cooling mode)	<65,000 Btu/h	95°F db/75°F wb outdoor air	14 SEER		AHRI 210/240
	≥65,000 Btu/h and <135,000 Btu/h	95°F db/75°F wb outdoor air	11 EER 12.2 IEER		AHRI 340/360
	≥135,000 Btu/h and <240,000 Btu/h	95°F db/75°F wb outdoor air	10.6 EER 11.6 IEER		
SPVHP (heating mode)	<65,000 Btu/h	47°F db/43°F wb outdoor air	8 HSPF		AHRI 210/240
	≥65,000 Btu/h and <135,000 Btu/h	47°F db/43°F wb outdoor air	3.3 COP <sub>H</sub>		AHRI 340/360
	≥135,000 Btu/h and <240,000 Btu/h	47°F db/43°F wb outdoor air	3.2 COP <sub>H</sub>		
Room air conditioners, with louvered sides	<8000 Btu/h		12.1 CEER	11.5 CEER	ANSI/AHAM RAC-1
	≥8000 Btu/h and <14,000 Btu/h		12 CEER	11.5 CEER	
	≥14,000 Btu/h and <20,000 Btu/h		11.8 CEER	11.2 CEER	
	≥20,000 Btu/h and <28,000 Btu/h		10.3 CEER	9.8 CEER	
	≥28,000 Btu/h		9.9 CEER	9.4 CEER	
Room air conditioners, without louvered sides	<8000 Btu/h		11 CEER	10.5 CEER	
	≥8000 Btu/h and <11,000 Btu/h		10.6 CEER	10.1 CEER	
	≥11,000 Btu/h and <14,000 Btu/h		10.5 CEER	10 CEER	
	≥14,000 Btu/h and <20,000 Btu/h		10.2 CEER	9.7 CEER	
	≥20,000 Btu/h		10.3 CEER	9.8 CEER	
Room air conditioner heat pump, with louvered sides	<20,000 Btu/h		10.8 CEER	10.3 CEER	
	≥20,000 Btu/h		10.2 CEER	9.7 CEER	

Room air conditioner heat pump, without louvered sides	<14,000 Btu/h		10.2 CEER	9.7 CEER
	≥14,000 Btu/h		9.6 CEER	9.1 CEER
Room air conditioners, casement only	All capacities		10.5 CEER	10 CEER
Room air conditioners, casement-slider	All capacities		11.4	10.8

- Chapter 6 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.
- Connected room air conditioners that are connected to utility programs are allowed a lower CEER value but must be in compliance with and certified per EnergyStar version 4.0 requirements for connected equipment.

**Addition of new Table C406.2(7) (Minimum efficiency requirements: Warm-air furnaces and combination warm-air furnaces/air-conditioning units, warm-air duct furnaces, and unit heaters).**

**Table C406.2(7)**

**Minimum efficiency requirements: Warm-air furnaces and combination warm-air furnaces/air-conditioning units, warm-air duct furnaces, and unit heaters**

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE <sup>a</sup>
Warm-air furnace, gas fired (weatherized)	<225,000 Btu/h	Maximum capacity <sup>c</sup>	81% AFUE <sup>b</sup>	DOE 10 CFR Part 430 or Section 2.39, Thermal Efficiency, ANSI Z21.47
	≥225,000 Btu/h		80% E <sub>t</sub> <sup>d</sup>	Section 2.39, Thermal Efficiency, ANSI Z21.47
Warm-air furnace, gas fired (nonweatherized)	<225,000 Btu/h	Maximum capacity <sup>c</sup>	90% AFUE or 92% E <sub>t</sub> <sup>b,d</sup>	DOE 10 CFR Part 430 or Section 2.39, Thermal Efficiency, ANSI Z21.47
	≥225,000 Btu/h		92% E <sub>t</sub> <sup>d</sup>	Section 2.39, Thermal Efficiency, ANSI Z21.47
Warm-air furnace, oil fired (weatherized)	<225,000 Btu/h	Maximum capacity <sup>c</sup>	78% AFUE <sup>b,d</sup>	DOE 10 CFR Part 430 or Section 42, Combustion, UL 727
	≥225,000 Btu/h		81% E <sub>t</sub> <sup>d</sup>	Section 42, Combustion, UL 727
Warm-air furnace, oil fired (nonweatherized)	<225,000 Btu/h	Maximum capacity <sup>c</sup>	85% AFUE or 87% E <sub>t</sub> <sup>b,d</sup>	DOE 10 CFR Part 430 or Section 42, Combustion, UL 727
	≥225,000 Btu/h		87% E <sub>t</sub> <sup>d</sup>	Section 42, Combustion, UL 727
Warm-air duct furnace, gas fired (weatherized)	All capacities	Maximum capacity <sup>c</sup>	80% E <sub>c</sub> <sup>e</sup>	Section 2.10, Efficiency, ANSI Z83.8
Warm-air duct furnace, gas fired (nonweatherized)	All capacities	Maximum capacity <sup>c</sup>	90% E <sub>c</sub> <sup>e</sup>	Section 2.10, Efficiency, ANSI Z83.8

Warm-air unit heater, gas fired (weatherized)	All capacities	Maximum capacity <sup>c</sup>	90% E <sub>c</sub> <sup>e,f</sup>	Section 40, Combustion, UL 731
Warm-air unit heater, gas fired (nonweatherized)	All capacities	Maximum capacity <sup>c</sup>	80% E <sub>c</sub> <sup>e,f</sup>	Section 2.10, Efficiency, ANSI Z83.8

- Chapter 6 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.
- Combination units not covered by the U.S. Department of Energy Code of Federal Regulations 10 CFR 430 (three-phase power or cooling capacity greater than or equal to 19 kW) may comply with either rating.
- Compliance of multiple firing rate units shall be at the maximum firing rate.
- E<sub>t</sub> = thermal efficiency. Units must also include an interrupted or intermittent ignition device (IID), have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.
- E<sub>c</sub> = combustion efficiency (100% less flue losses). See test procedure for detailed discussion.
- As of August 8, 2008, according to the Energy Policy Act of 2005, units must also include an interrupted or intermittent ignition device (IID) and have either power venting or an automatic flue damper.

**Addition of new Table C406.2(8) (Minimum efficiency requirements: Gas and oil-fired boilers).**

**Table C406.2(8)**  
**Minimum efficiency requirements: Gas and oil-fired boilers**

EQUIPMENT TYPE <sup>a</sup>	SUBCATEGORY OR RATING CONDITION	SIZE CATEGORY (INPUT)	MINIMUM EFFICIENCY <sup>b,c</sup>	TEST PROCEDURE <sup>b</sup>
Boilers, hot water	Gas fired	<300,000 Btu/h <sup>i</sup>	89% AFUE <sup>f,h</sup>	10 CFR Part 430
		≥300,000 Btu/h and ≤2,500,000 Btu/h <sup>d</sup>	89% E <sub>t</sub> <sup>f</sup>	10 CFR Part 431
		>2,500,000 Btu/h <sup>a</sup>	91% E <sub>c</sub> <sup>f</sup>	
	Oil fired <sup>e</sup>	<300,000 Btu/h	89% AFUE <sup>f</sup>	10 CFR Part 430
		≥300,000 Btu/h and ≤2,500,000 Btu/h <sup>d</sup>	85% E <sub>t</sub> <sup>f</sup>	10 CFR Part 431
		>2,500,000 Btu/h <sup>a</sup>	86% E <sub>c</sub> <sup>f</sup>	
Boilers, steam	Gas fired	<300,000 Btu/h <sup>i</sup>	80% AFUE	10 CFR Part 430
	Gas fired All except natural draft	≥300,000 Btu/h and ≤2,500,000 Btu/h <sup>d</sup>	79% E <sub>t</sub>	10 CFR Part 431
		>2,500,000 Btu/h <sup>a</sup>	79% E <sub>t</sub>	
	Gas fired natural draft	≥300,000 Btu/h and ≤2,500,000 Btu/h <sup>d</sup>	77% E <sub>t</sub>	
		>2,500,000 Btu/h <sup>a</sup>	77% E <sub>t</sub>	
	Oil fired <sup>e</sup>	<300,000 Btu/h <sup>i</sup>	82% AFUE	10 CFR Part 430 10 CFR Part 431
		≥300,000 Btu/h and ≤2,500,000 Btu/h <sup>d</sup>	81% E <sub>t</sub>	
>2,500,000 Btu/h <sup>a</sup>		81% E <sub>t</sub>		

- These requirements apply to boilers with rated input of 2344 kW or less that are not packaged boilers, and to all packaged boilers. Minimum efficiency requirements for boilers cover all capacities of packaged boilers.
- E<sub>c</sub> = thermal efficiency (100% less flue losses). See reference document for detailed information.
- E<sub>t</sub> = thermal efficiency. See reference document for detailed information.
- Maximum capacity—minimum and maximum ratings as provided for and allowed by the unit's controls.
- Includes oil fired (residual).



- f. Systems shall be designed with lower operating return hot-water temperatures (<55°C) and use hot-water reset to take advantage of the higher efficiencies of condensing boilers.
- g. Chapter 6 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.
- h. A boiler not equipped with a tankless domestic water-heating coil shall be equipped with an automatic means for adjusting the temperature of the water such that an incremental change in inferred heat load produces a corresponding incremental change in the temperature of the water supplied.
- i. Boilers shall not be equipped with a continuous pilot ignition system.

**Addition of new Table C406.2(9) (Minimum efficiency requirements: Performance requirements for heat rejection equipment).**

**Table C406.2(9)  
Minimum efficiency requirements: Performance requirements for heat rejection equipment**

EQUIPMENT TYPE	TOTAL SYSTEM HEAT REJECTION CAPACITY AT RATED CONDITIONS	SUBCATEGORY OR RATING CONDITION <sup>g</sup>	PERFORMANCE REQUIRED <sup>a,b,c,d,e,f,i</sup>	TEST PROCEDURE <sup>h</sup>
Propeller or axial fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75° entering wb	≥42.1 gpm/hp	CTI ATC-105 and CTI STD-201RS
Centrifugal fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75° entering wb	≥22 gpm/hp	
Propeller or axial fan closed-circuit cooling towers	All	102°F entering water 90°F leaving water 75° entering wb	≥16.1 gpm/hp	
Centrifugal fan closed-circuit cooling towers	All	102°F entering water 90°F leaving water 75° entering wb	≥8 gpm/hp	
Propeller or axial fan evaporative condensers	All	Ammonia test fluid 140°F entering gas temperature 96.3°F condensing temperature 75° entering wb	≥134,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	Ammonia test fluid 140°F entering gas temperature 96.3°F condensing temperature 75° entering wb	≥110,000 Btu/h·hp	
Propeller or axial fan evaporative condensers	All	R-507A test fluid 165°F entering gas temperature 105°F condensing temperature 75° entering wb	≥157,000 Btu/h·hp	
Centrifugal fan evaporative condensers	All	R-507A test fluid 165°F entering gas temperature 105°F condensing	≥135,000 Btu/h·hp	

		temperature 75° entering wb		
Air-cooled condensers	All	190°F entering gas temperature 125°F condensing temperature 15°F subcooling 75° entering wb	≥176,000 Btu/h·hp	AHRI 460

- a. For purposes of this table, open-circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table B-8 divided by the fan motor nameplate power.
- b. For purposes of this table, closed-circuit cooling tower performance is defined as the process water flow rating of the tower at the thermal rating condition listed in Table B-8 divided by the sum of the fan motor nameplate power and the integral spray pump motor nameplate power.
- c. For purposes of this table, evaporative condenser performance is defined as the heat rejected at the specified rating condition in the table divided by the sum of the fan motor nameplate power and the integral spray pump nameplate power.
- d. For purposes of this table, air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan motor nameplate power.
- e. The efficiencies and test procedures for both open- and closed-circuit cooling towers are not applicable to hybrid cooling towers that contain a combination of separate wet and dry heat exchange sections. The certification requirements do not apply to field erected cooling towers.
- f. All cooling towers, closed-circuit coolers, evaporative condensers and air-cooled condensers shall comply with the minimum efficiency listed in the table for that specific type of equipment with the capacity effect of any project specific accessories and/or options included with the equipment.
- g. Requirements for evaporative condensers are listed with ammonia (R-717) and R-507A as test fluids in the table. Evaporative condensers intended for use with halocarbon refrigerants other than R-507A must meet the minimum efficiency requirements listed for R-507A as the test fluid.
- h. Informative Appendix G contains information on the referenced test procedures.
- i. Not applicable for air-cooled condensers applied to condenserless chillers. The air-cooled condenser and condenserless chiller shall comply with the requirements for air-cooled chillers as defined in ANSI/ASHRAE/IES Standard 90.1, Table 6.8.1-3.

**Replacement of Section C406.5 (On-site renewable energy).**

**C406.5 Dedicated outdoor air system.** Buildings containing equipment or systems regulated by Section C403.3.4, C403.4.3, C403.4.4, C403.4.5, C403.6, C403.8.4, C403.8.5, C403.8.5.1, C403.9.1, C403.9.2, C403.9.3 or C403.9.4 shall be equipped with an independent ventilation system designed to provide not less than the minimum 100-percent outdoor air to each individual occupied space, as specified by the International Mechanical Code. The ventilation system shall be capable of energy recovery. The HVAC system shall include supply-air temperature controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperatures. The controls shall reset the supply-air temperature not less than 25 percent of the difference between the design supply-air temperature and the design room-air temperature.

**Replacement of Section C406.6 (Dedicated outdoor air system).**

**C406.6 Enhanced envelope performance.** The total UA of the building thermal envelope as designed shall be not less than 15 percent below the total UA of the building thermal envelope in accordance with Section C402.1.5.

**Replacement of Section C406.7 (Reduced energy use in service water heating).**

**C406.7 Reduced air infiltration.** Air infiltration shall be verified by whole building pressurization testing conducted in accordance with Section C402.5.1.3. The measured air leakage rate of the building envelope shall not exceed 0.25 cfm/ft<sup>2</sup> (2.0 L/s•m<sup>2</sup>) under a pressure differential of 0.3 in. water (75 Pa), with the calculated surface area being the sum of the above and below grade building envelope. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the code official and the building owner.

**Amendments to Section C408.2 (Mechanical, renewable energy, and service water heating systems commissioning and completion requirements).**

**C408.2 Mechanical, renewable energy, and service water heating systems commissioning and completion requirements.** This Section is required when one of the following conditions are met:

1. The building is not less than 25,000 square feet (2,325 m<sup>2</sup>)
2. The total mechanical equipment capacity being installed is greater than 480,000 Btu/h (140.7 kW) cooling capacity
3. The combined service water-heating and space-heating capacity is greater than 600,000 Btu/h (175.8 kW) combined service water-heating and space-heating capacity.

Prior to passing the final mechanical and plumbing inspections, the *registered design professional or approved agency* shall provide evidence of systems *commissioning* and completion in accordance with the provisions of this section.

*Construction document* notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner or owner's authorized agent and made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

Mechanical systems, renewable energy, and service water heating systems shall include but are not limited to, at a minimum, the following heating, ventilating, air conditioning, service water heating, indoor air quality and refrigeration systems (mechanical and/or passive) and associated controls:

1. Heating, cooling, air handling and distribution, ventilation, and exhaust systems, and their related air quality monitoring systems.
2. Air, water, and other energy recovery systems.
3. Manual or automatic controls, whether local or remote, on energy using systems including but not limited to temperature controls, setback sequences, and occupancy based control, including energy management functions of the building management system.
4. Plumbing, including insulation of piping and associated valves, domestic and process water pumping, and mixing systems.
5. Mechanical heating systems and service water heating systems.
6. Refrigeration systems.
7. Renewable energy and energy storage systems where installed generating capacity is not less than 25kW.
8. Other systems, equipment and components that are used for heating, cooling or ventilation and that affect energy use.

## Amendments to Section C408.2.2 (Systems adjusting and balancing).

**C408.2.2 Systems adjusting and balancing.** HVAC systems shall be balanced in accordance with ANSI/ASHRAE 111, "Testing, Adjusting, and Balancing of Building HVAC Systems" or other approved engineering standards.

**C408.2.2.1 Air systems balancing.** Each supply air outlet and *zone* terminal device shall be equipped with means for air balancing in accordance with the requirements of Chapter 6 of the *International Mechanical Code*. Discharge dampers used for air-system balancing are prohibited on constant-volume fans and variable volume fans with motors 10 hp (18.6 kW) and larger. Air systems shall be balanced in a manner to first minimize throttling losses then, for fans with system power of greater than 1 hp (0.746 kW), fan speed shall be adjusted to meet design flow conditions.

**Exception:** Fans with fan motors of 1 hp (0.74 kW) or less are not required to be provided with a means for air balancing.

**C408.2.2.2 Hydronic systems balancing.** Individual hydronic heating and cooling coils shall be equipped with means for balancing and measuring flow. Hydronic systems shall be proportionately balanced in a manner to first minimize throttling losses, then the pump impeller shall be trimmed or pump speed shall be adjusted to meet design flow conditions. Each hydronic system shall have either the capability to measure pressure across the pump, or test ports at each side of each pump.

**Exception:** The following equipment is not required to be equipped with a means for balancing or measuring flow:

1. Pumps with pump motors of 5 hp (3.7 kW) or less.
2. Where throttling results in not greater than 5 percent of the nameplate horsepower draw above that required if the impeller were trimmed.

## Addition of new Section C408.4 (Air barrier commissioning).

**C408.4 Air barrier commissioning.** Prior to passing final inspection, the registered design professional shall provide evidence of air barrier commissioning and completion in accordance with the provisions of this Section.

### Addition of new Section C408.4.1 (Documentation).

**C408.4.1 Documentation.** Construction documents shall include documentation of the continuous air barrier components included in the design and a field inspection checklist that includes all requirements necessary for maintaining air barrier continuity and durability in accordance with Section C402.5.1.

### Addition of new Section C408.4.2 (Field inspections).

**C408.4.2 Field inspections.** Reports from field inspections during project construction showing compliance with continuous air barrier requirements including proper material handling and storage, use of approved materials and material substitutes, proper material and surface preparation, and air barrier continuity shall be provided to the owner and, upon request, to the code official. Air barrier continuity shall be determined by testing or inspecting each type of unique air barrier joint or seam in the building envelope for continuity and defects.

**Addition of new Section C408.4.3 (Report).**

**C408.4.3 Report.** A final commissioning report indicating compliance with the continuous air barrier requirements shall be provided to the building owner and, upon request, to the code official.

**Addition of new Section C409 (Additional power distribution system packages)**

**Section C409**

**Additional Power Distribution System Packages**

**C409.1 General (Mandatory).** New buildings shall comply with at least one of the following:

1. Additional on-site renewable energy in accordance with Section C409.2.
2. Energy monitoring in accordance with Section C409.3.
3. Interoperable automated demand-response (AutoDR) infrastructure in accordance with Section C409.4.
4. Electric vehicle charging stations in accordance with Section C409.5
5. Community solar procurement in accordance with Section C409.6 (pending).

**C409.2 On-site renewable energy.** The total minimum rating of onsite renewable energy systems shall be one of the following:

1. Not less than 1.71 Btu/hr/ft<sup>2</sup> (5.4 w/m<sup>2</sup>) or 0.50 w/ft<sup>2</sup> of conditioned floor area.
2. Not less than 3 percent of energy use within the building for mechanical, service hot water heating and lighting regulated in Chapter 4 [CE].

**C409.3 Electrical energy monitoring.** Buildings shall comply with Sections C409.3.1 through C409.3.4. Buildings shall be equipped to measure, monitor, record and report electricity consumption data for each end-use category listed in Table C409.3.1. For buildings with tenants, the end-uses in Table 409.3.1 shall be separately monitored for the total building and (excluding shared systems) each individual tenant.

**Exception:**

1. Up to 10% of the load for each of the end uses shall be allowed to be from other electrical loads.
2. Individual tenant spaces that have their own utility services and meters and have less than 5,000 square feet (465 m<sup>2</sup>) of conditioned floor area.

**C409.3.1 End-use metering categories.** Meters or other approved measurement devices shall be provided to collect energy use data for each end-use category specified in Table C409.3.1. These meters shall have the capability to collect energy consumption data for the whole building or for each separately metered portion of the building. Where multiple meters are used to measure any end-use category, the data acquisition system shall total all the energy used by that category. Not more than 5 percent of the measured load for each end-use category specified in Table C409.3.1 shall be from a load not within that category.

**TABLE C409.3.1  
ENERGY USE CATEGORIES**

LOAD CATEGORY
HVAC systems including hot water
Interior lighting
Exterior lighting
Receptacle circuits
Total electrical energy

**C409.3.2 Meters.** Meters and other measurement devices required by this Section shall be configured to automatically communicate energy consumption data to the data acquisition system required by Section C409.3.3. Source meters shall be any digital-type meter. Lighting, HVAC and other building systems that can monitor their energy consumption shall not require meters. Current sensors are an alternative to meters, provided that they have a tested accuracy of +/-2 percent. Required metering systems and equipment shall be able to provide not less than hourly data that is fully integrated into the data acquisition system and produce a graphical energy report in accordance with Sections C409.3.3 and C409.3.4.

**C409.3.3 Data acquisition systems.** A data acquisition system shall have the capability to store data from the required meters and other sensing devices for not less than 36 months. The data acquisition system shall be able to store real-time energy consumption data and provide hourly, daily, monthly, and yearly logged data for each end-use category required by Table C409.3.1.

**C409.3.4 Graphical energy report.** A permanent reporting mechanism shall be provided in the building that can be accessed by building operation and management personnel. The reporting mechanism shall be able to graphically provide the energy consumption data for each end-use category required by Table C409.3.1 for not less than every hour, day, month and year for the previous 36 months.

**C409.4 Interoperable automated demand-response (AutoDR) infrastructure.** The building controls shall be designed with automated demand-response (Auto-DR) infrastructure capable of receiving demand-response requests from the utility, electrical system operator, or third party DR program provider, and of automatically implementing load adjustments to the HVAC and lighting-systems.

Buildings shall comply with the following:

1. HVAC systems shall be programmed to allow automatic centralized demand reduction in response to a signal from a centralized contact or software point.
2. HVAC equipment with variable speed control shall be programmed to allow automatic adjustment of the maximum speed of the equipment.
3. Lighting systems with central control shall be programmed to allow automatic reduction of total connected lighting power.

**C409.5 Electric vehicle charging stations.** Not less than two electric vehicle charging stations at minimum 208/240V 40 amp shall be provided on the *building site*.

**C409.6 (Community Solar).** Contract for a period of at least 15 years in a community distributed generation system as defined in NY PSC order #15-E-0082 for a percentage share membership securing electricity generating capacity not less than 1.71 Btu/hr/ft<sup>2</sup> (5.4 w/m<sup>2</sup>) or 0.50 w/ft<sup>2</sup> of conditioned floor area, and provide contract documentation to the code official.

**Addition of new Section C503.4.2 (Commissioning).**

**C503.4.2 Commissioning.** New heating, cooling and duct system components that are part of the alteration and the controls that serve them shall comply with Sections C408.2.2, C408.2.3 and C408.2.5.

**Exceptions:** The following systems are exempt:

1. Mechanical systems in alterations where the total mechanical equipment capacity is less than 480,000 Btu/h (140.7 kW) cooling capacity and 600,000 Btu/h (175.8 kW) combined service water heating and space heating capacity.
2. Systems included in Section C403.3 that serve individual dwelling units and sleeping units.

**Addition of new Section C503.5.1 (Commissioning).**

**C503.5.1 Commissioning.** New service hot water system components that are part of the alteration and the controls that serve them shall comply with Sections C408.2.2, C408.2.3 and C408.2.5.

**Exception:** Service hot water systems in alterations where the combined service water heating and space heating capacity is less than 600,000 Btu/h (175.8 kW).

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# PART 2

## Amendments to ASHRAE 90.1-2016

### Addition to Section 3.2 Definitions.

**On-site electricity generation systems:** systems located at the *building* site that generate electricity, including but not limited to generators, combined heat and power systems, fuel cells, and *on-site renewable energy* systems.

### Amendments to Section 4.2.1.1 New Buildings

#### 4.2.1.1 New Buildings.

New buildings shall comply with 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,” or
- b. Section 11, “Energy Cost Budget Method,” and the provisions of Section 4.2.1.1.2 , or
- c. Appendix G, “Performance Rating Method.” and the provisions of Section 4.2.1.1.2 and Section 4.2.1.1.3.

When using Appendix G, the Performance Cost Index (PCI) shall be less than or equal to the Performance Cost Index Target (PCIt) when calculated in accordance with the following:

$$PCIt = [BBUEC + (BPF \times BBREC)]/BBP$$

Where

PCI = Performance Cost Index calculated in accordance with Section G1.2.

BBUEC = Baseline *Building Unregulated Energy Cost*, the portion of the annual *energy* cost of a *baseline building design* that is due to *unregulated energy use*.

BBREC = Baseline *Building Regulated Energy Cost*, the portion of the annual *energy* cost of a *baseline building design* that is due to *regulated energy use*.

BPF = *Building Performance Factor* from Table 4.2.1.1. For *building area* types not listed in Table 4.2.1.1 use “All others.” Where a *building* has multiple *building area* types, the required BPF shall be equal to the area-weighted average of the *building area* types.

BBP = *Baseline Building Performance*.

Regulated *energy* use shall be calculated by multiplying the total *energy* use by the ratio of *regulated energy* use to total *energy* use for each *fuel* type. Unregulated *energy* use shall be calculated by subtracting regulated *energy* use from total *energy* use. When Appendix G is used for the comparison of building *energy* use only, the comparison shall be performed on a site *energy* basis or on a source *energy* basis, in accordance with Section 4.2.1.1.1, without respect to *energy* rates.



**Table 4.2.1.1 Building Performance Factor (BPF) (pending<sup>a</sup>)**

Building Area Type <sup>a</sup>	4A	5A	6A
Office			
Retail			
School			
Hotel/motel			
Multifamily			
All others			
<p>a. Modified values for Table 4.2.1.1 are under development based on Pacific Northwest National Lab (PNNL) modeling results for NYStretch Code – Energy 2018.</p> <p>b. In cases where both a general <i>building</i> area type and a specific <i>building</i> area type are listed, the specific <i>building</i> area type shall apply</p>			

**Addition of new Section 4.2.1.1.1 (Source Energy Method)**

**4.2.1.1.1 Source Energy Method.**

For the purpose of quantifying the projected Source Energy consumption of a building, the Source to Site Fuel Conversion factors in Table 4.2.1.1.1 shall apply.

**Addition of Table 4.2.1.1.1 (Source to Site Energy Conversion Ratios).**

**Table 4.2.1.1.1  
Source to Site Energy Conversion Ratios**

Energy Type	New York Ratio
Electricity (Grid Purchase)	2.55
Electricity ( <i>On-site Renewable Energy</i> Installation)	1.00
Natural Gas	1.05
Fuel Oil	1.01
Propane & Liquid Propane	1.01
Steam	1.20
Hot Water	1.20
Chilled Water, Coal, Wood, Other	1.00

**Addition of new Section 4.2.1.1.2 (Envelope Performance Factor)**

**4.2.1.1.2 Envelope Performance Factor.**

An envelope performance factor shall be calculated in accordance with 90.1 Appendix C, except fixed metal framing fenestration must be used for the baseline vertical fenestration irrespective of the fenestration type in the proposed design. Envelope performance factors shall be as follows:

- a) For *buildings with residential spaces*, the envelope performance factor shall be less than or equal to 115% of the envelope performance factor of the baseline building design calculated in accordance with Appendix C;
- b) For all other *buildings*, the envelope performance factor shall be less than or equal to 107% of the envelope performance factor of the baseline building design calculated in accordance with Appendix C.

## Addition of new Section 4.2.1.1.3 (Reductions Based on Fuel-type Use).

### 4.2.1.1.3 Reductions Based on Fuel-type Use.

The reduction in design energy use associated with the heat recovered from on-site electricity generation systems must be determined by modeling the specified back-up systems in place of the recovered heat. If the backup systems are not specified, or have insufficient capacity, the systems modeled in place of recovered heat must be treated as yet-to-be-designed, and modeled based on Standard 90.1-2016 (as amended) Table 11.5.1 No 1 (c).

The reduction in design energy use associated with *on-site renewable energy* systems shall not exceed 5 percent of the calculated proposed building performance.

## Amendments to Section 5.4.3.1.3 (Testing, Acceptable Materials, and Assemblies)

### 5.4.3.1.3 Testing, Acceptable Materials, and Assemblies

The building shall comply with whole-building pressurization testing in accordance with Section 5.4.3.1.3(a) or with the continuous air barrier requirements in Section 5.4.3.1.3(b) or 5.4.3.1.3(c).

**Exception:** New buildings not less than 25,000 square feet and not greater than 50,000 square feet, and less than or equal to 75 feet in height, must show compliance through testing in accordance with Section 5.4.3.1.3(a).

## Amendments to Section 11.2 (Compliance)

### 11.2 Compliance

Compliance with Section 11 will be achieved if

- a. all requirements of Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4 are met;
- b. the design building energy use, as calculated in Section 11.5, does not exceed the building *energy use budget*, as calculated by the *simulation program* described in Section 11.4, multiplied by the building factors in Table 11.2.1. The comparison shall be performed on a site energy basis, or on a source energy basis in accordance Section 4.2.1.1.1, without respect to energy rates; and
- c. the *energy efficiency* level of components specified in the *building* design meet or exceed the *efficiency* levels used to calculate the design energy cost.

**Table 11.2.1 Building Factors (pending<sup>a</sup>)**

<b>Building Area Type<sup>b</sup></b>	<b>4A</b>	<b>5A</b>	<b>6A</b>
Office			
Retail			
School			
Hotel/motel			
Multifamily			
All others			

a. New values for Table 11.2.1 are under development based on PNNL modeling results for NYStretch Code – Energy 2018. These new values will reflect NYStretch Code – Energy 2018 energy use budgets by building type and climate zone.

b. In cases where both a general *building* area type and a specific *building* area type are listed, the specific *building* area type shall apply.

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# PART 3

## Amendments to 2018 International Energy Conservation Code Residential Provisions

### Amendments to Section 401.2 (Compliance)

**R401.2 Compliance.** Projects shall comply with one of the following:

1. The provisions of Section R407 (Additional Energy Efficiency Credits) and the provisions of Sections R401 through R404.
2. The provisions of Section R408 (passive house) and the provisions of Sections R401 through R404.
3. The provisions of Section R406 (ERI).
4. For projects other than detached one and two-family dwellings, the provisions of Section R405 (simulated performance) and the provisions of Sections R401 through R404 labeled “Mandatory.” The building energy cost shall be equal to or less than 80 percent of the standard reference design building.

### Amendments to Table R402.1.2 (Insulation and fenestration requirements by component)

**Table R402.1.2**  
Insulation and fenestration requirements by component<sup>a</sup>

Climate Zone	Fenestration U-factor	Skylight U-factor	Glazed fenestration SHGC	Ceiling <sup>b</sup> R-Value	Wood Frame Wall <sup>c,d</sup> R-Value	Mass Wall <sup>e</sup> R-Value	Floor R-Value	Basement Wall <sup>f</sup> R-Value	Slab <sup>g</sup> R-Value and Depth	Crawl Space Wall <sup>f</sup> R-Value
4	0.27	0.50	0.4	49	21 int	21/21	30	10/15/21 int + TB	10,2 ft	10/15/21 int + TB
5	0.27	0.50	NR	49	21 int	21/21	30	10/15/21 int + TB	10,2 ft	10/15/21 int + TB
6	0.27	0.50	NR	49	20+5 or 13+10	21/21	30	10/15/21 int + TB	10,4 ft	10/15/21 int + TB

NR = Not Required

- a. R-values are minimums. U-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed R-value of the insulation shall be not less than the R-value specified in the table.
- b. For single rafter- or joist-vaulted ceilings, the insulation may be reduced to R-38.
- c. Int. (intermediate framings) denotes standard framing 16 inches on center. Headers shall be insulated with a minimum of R-10 insulation.
- d. The first value is cavity insulation, the second value is continuous insulation. Therefore, as an example, “13+10” means R-13 cavity insulation plus R-10 continuous insulation.
- e. The second R-value applies when more than half the insulation is on the interior of the mass wall.
- f. “10/15/21 + TB” means R-10 continuous insulation on the exterior of the wall, or R-15 continuous insulation on the interior of the wall, or R-21 cavity insulation plus a thermal break between the slab and the and the basement wall at the interior of the basement wall. “10/15/21 + TB” shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the wall. “TB” means thermal break between floor slab and basement wall.
- g. R-10 continuous insulation shall be provided under the full slab area of a heated slab in addition to the required slab edge insulation R-value for slabs as indicated in the table. The slab edge insulation for heated slabs shall not be required to extend below the slab.

## Amendments to Table R402.1.4 (Equivalent U-factors)

**Table R402.1.4**  
**Equivalent U-factors<sup>a</sup>**

Climate Zone	Fenestration U-factor	Skylight U-factor	Ceiling U-factor	Frame Wall U-factor	Mass Wall U-factor <sup>b</sup>	Floor U-factor	Basement Wall U-factor	Crawl Space Wall U-factor
4	0.27	0.50	0.026	0.056	0.056	0.029	0.042	0.042
5	0.27	0.50	0.026	0.056	0.056	0.029	0.042	0.042
6	0.27	0.50	0.026	0.045	0.056	0.029	0.042	0.042

- Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.
- Mass wall shall be in accordance with Section R402.2.5. Where more than half the insulation is on the interior, the mass wall U-factor shall not exceed 0.056.

## Delete Section R402.2.2 (Ceilings without attic spaces).

### Amendments to Section R402.4.1.1 (Installation)

**R402.4.1.1 Installation.** The components of the *building thermal envelope* as indicated in Table R402.4.1.1 shall be installed in accordance with the manufacturer's instruction and the criteria indicated in Table R402.4.1.1 as applicable to the method of construction.

An approved agency shall inspect all components and verify compliance. The inspection shall include an open wall visual inspection of all components included in Table R402.4.1.1 and shall meet the RESNET Grade I insulation requirements.

### Amendments to Section R403.3 (Ducts)

**R403.3 Ducts.** Ducts and air handlers shall be installed in accordance with Section R403.3.1 through R403.3.8.

#### Amendments to Section R403.3.1 (Insulation (Prescriptive))

**R403.3.1 Duct located in conditioned space.** The duct system in new buildings and additions shall be located in a conditioned space. For ducts to be considered as inside a conditioned space, such ducts shall comply with either of the following:

- The duct system shall be located completely within the continuous air barrier and within the building thermal envelope.
- The ducts shall be buried within ceiling insulation in accordance with Section R403.3.6 and all of the following conditions shall exist:
  - The air handler is located completely within the continuous air barrier and within the building thermal envelope.
  - The duct leakage, as measured either by a rough-in test of the ducts or a post-construction total system leakage test to outside the building thermal envelope in accordance with Section R403.3.4, is less than or equal to 1.5 cubic feet per minute (42.5 L/min) per 100 square feet (9.29 m<sup>2</sup>) of conditioned floor area served by the duct system.
  - The ceiling insulation R-value installed against and above the insulated duct is greater than or equal to the proposed ceiling insulation R-value, less the R-value of the insulation on the duct.

#### Delete Section R403.3.7 (Ducts located in conditioned space)

### **Addition of new Section R403.3.8 (Duct system sizing (Mandatory)).**

**R403.3.8 Duct system sizing (Mandatory).** Ducts shall be sized in accordance with ACCA Manual D based on calculations made in accordance with Section R403.7 and Section R403.8.

### **Amendments to Section R403.5.4 (Drain water heat recovery units)**

**R403.5.4 Supply of heated water.** In new buildings, heated water supply piping shall be in accordance with Section R403.5.4.1, Section R403.5.4.2, Section R403.5.4.3 or Section R403.5.4.4. The flow rate through ¼-inch piping shall not exceed 0.5 gpm. The flow rate through 5/16-inch piping shall not exceed 1 gpm. The flow rate through 3/8-inch piping shall not exceed 1.5 gpm.

**R403.5.4.1 Maximum allowable pipe length method.** The maximum allowable pipe length from the nearest source of heated water to the termination of the fixture supply pipe shall be in accordance with the maximum pipe length in Table R403.5.4.1. Where the length contains more than one size of pipe, the largest size shall be used for determining the maximum allowable length of the piping in Table R403.5.4.1.

**R403.5.4.2 Maximum allowable pipe volume method.** The water volume in the piping shall be calculated in accordance with Section R403.5.4.2.1. The maximum volume of hot or tempered water in the piping to public lavatory faucets shall be 2 ounces. For fixtures other than public lavatory faucets, the maximum volume shall be 64 ounces for hot or tempered water from a water heater or boiler; and 24 ounces for hot or tempered water from a circulation loop pipe or an electrically heat-traced pipe. The water volume in the piping shall be calculated in accordance with Section R403.5.4.2.1.

**R403.5.4.2.1 Water volume determination.** The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the source of hot water and the termination of the fixture supply pipe. The volume shall be determined from the "Volume" column of Table R403.5.4.1. The volume contained within fixture shutoff valves, flexible water supply connectors to a fixture fitting, or within a fixture fitting shall not be included in the water volume determination. Where hot or tempered water is supplied by a circulation loop pipe or a heat-traced pipe, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

**Table R403.5.4.1  
Pipe Volume and Maximum Piping Lengths**

Nominal Pipe or Tube Size (inch)	VOLUME (Liquid Ounces Per Foot Length)	Maximum Pipe or Tube Length		
		System without a circulation loop or heat-traced line (feet)	System with a circulation loop or heat-traced line (feet)	Lavatory faucets – public (metering and nonmetering (feet)
1/4 <sup>a</sup>	0.33	50	16	6
5/16 <sup>a</sup>	0.5	50	16	4
3/8 <sup>a</sup>	0.75	50	16	3
1/2	1.5	43	16	2
5/8	2	32	12	1
3/4	3	21	8	0.5
7/8	4	16	6	0.5
1	5	13	5	0.5
1 1/4	8	8	3	0.5
1 1/2	11	6	2	0.5
2 or larger	18	4	1	0.5

a. The flow rate for ¼-inch size pipe or tube is limited to 0.5 gallons per minute; for 5/16-inch size, it is limited to 1 gpm; for 3/8-inch size, it is limited to 1.5 gpm.

**R403.5.4.3 Drain water heat recovery units.** New buildings shall include a drain water heat recovery unit that captures heat from at least one shower, and such drain water heat recovery unit must have a minimum efficiency of 40% if installed for equal flow or a minimum efficiency of 52% if installed for unequal flow. Drain water heat recovery units shall comply with CSA B55.2. Drain water heat recovery units shall be tested in accordance with CSA B55.1. Potable water-side pressure loss of drain water heat recovery units shall be less than 3 psi for individual units connected to one or two showers. Potable water-side pressure loss of drain water heat recovery units shall be less than 2 psi for individual units connected to three or more showers.

**R403.5.4 Recirculation Systems.** Projects shall include a recirculation system with no more than 0.5 gallon (1.9 liter) storage. The storage limit shall be measured from the point where the branch feeding the fixture branches off the recirculation loop to the fixture. Recirculation systems must be based on an occupant-controlled switch or an occupancy sensor, installed in each bathroom which is located beyond a 0.5 gallon stored-volume range from the water heater.

**Addition of new Section R403.6.2 (Balanced and HRV/ERV systems (Mandatory))**

**R403.6.2 Balanced and HRV/ERV systems (Mandatory).** In new buildings, every dwelling unit shall be served by a heat recovery ventilator (HRV) or energy recovery ventilator (ERV) installed per manufacturer’s instructions. The HRV/ERV must be sized adequately for the specific application, which will include the building’s conditioned area, and number of occupants.

**Exception:** When a balanced ventilation system is designed and installed according to the requirements of Section M1507.3 of the 2015 International Residential Code (IRC) and provides outdoor air at the rate required in Section M1507.3.3 and Table M1507.3.3(1). Outdoor air supplied per IRC Section M1507.3.1, using the return side of the building’s heating and/or cooling system air handler for supply air, shall be permitted to comply with this section. In the balanced system design, an equal amount of exhaust air must be provided by a continuous run, or intermittent run fan or fans, located remotely from the source of supply air. Intermittent run

fans shall be sized per Table M1507.3.3(1) and fan capacities adjusted for run time per Table M1507.3.3(2). The air handler capacity intake shall also be adjusted for run time per Table M1507.3.3(2).

**Addition of new Section R403.6.3 (Verification).**

**R403.6.3 Verification.** Installed performance of the mechanical ventilation system shall be tested and verified by an *approved agency* and measured using a flow hood, flow grid, or other airflow measuring device in accordance with Air Conditioning Contractors of America (ACCA) HVAC Quality Installation Verification Protocols – ANSI/ACCA 9QIvp-2016.

**Amendments to Section R404.1 (Lighting equipment (Mandatory))**

**R404.1 Lighting equipment (Mandatory).** Not less than 90 percent of the permanently installed lighting fixtures shall use lamps with an efficacy of at least 65 lumens per watt, or have a total luminaire efficacy of at least 45 lumens per watt.

**R404.1.1 Lighting equipment (Mandatory).** Fuel gas lighting systems shall not have continuously burning pilot lights.

**Addition of new Section R404.2 (Electrical power packages (Mandatory))**

**R404.2 Electrical power packages (Mandatory).** New buildings shall comply with the following:

1. Solar-ready zone. Detached one and two family dwellings and townhouses where the conditioned space is greater than 1,400 square feet shall comply with the requirements of Appendix RA.
2. Electrical Vehicle Service Equipment Capable. Detached one or two family dwellings and townhouses with parking area provided on the *building site* shall provide a 208/240V 40-amp outlet for each dwelling unit or panel capacity and conduit for the future installation of such an outlet. Outlet or conduit termination shall be adjacent to the parking area. For residential occupancies where there is a common parking area, provide either:
  - a. 208/240V 40-amp outlets for 5 percent of the total parking spaces, but not less than one outlet; or
  - b. Panel capacity and conduit for the future installation of 208/240V 40-amp outlets for 5 percent of the total parking spaces, but not less than one outlet.

**Amendments to Section R406.2 (Mandatory requirements)**

**R406.2 Mandatory requirements.** Compliance with this section requires that the provisions identified in Sections R401 through R404 indicated as “Mandatory” and Section R403.5.3 be met.



**Amendments to Table R406.4 (Maximum Energy Rating Index)**

**Table R406.4  
Maximum Energy Rating Index**

Climate Zone	Energy Rating Index <sup>a</sup>
4	50
5	50
6	50

Where on-site renewable energy is included for compliance using the ERI analysis of Section R406.4, the building shall meet the mandatory requirements of Section R406.2, and the building thermal envelope shall be greater than or equal to the levels of efficiency and SHGC in Table R402.1.2 or R402.1.4 of the 2015 *International Energy Conservation Code*.

**Amendments to Section R406.6.1 (Compliance software tools)**

**R406.6.1 Compliance software tools.** Software tools used for determining ERI shall be Approved Software Rating Tools in accordance with RESNET/ICC 301 - 2019.

**Addition of new Section R407 (Additional Energy Efficiency Credits)**

**Section R407  
Additional Energy Efficiency Credits**

**R407.1 Additional Energy Efficiency Credit Requirements.** New buildings shall comply with sufficient options from Table R407.1 so as to achieve the following minimum number of credits:

1. Detached one family and two family dwellings: 2.0 credits taken from Column A in Table R407.1
2. All other residential buildings: 3.0 credits taken from Column B in Table R407.1

**Table R407.1  
Additional Energy Efficiency Credits**

Option	Description	Column A	Column B
High efficiency envelope options			
1.1	If window area $\leq 15\%$ of conditioned floor area: <ul style="list-style-type: none"> <li>• Exterior walls – <math>U \leq 0.045</math> (area weighted average).</li> </ul> If window area $\geq 15\%$ of conditioned floor area, add: <ul style="list-style-type: none"> <li>• Windows <math>U = 0.25</math> (area weighted average)</li> </ul>	0.5	0.5
1.2	Exterior wall – $U \leq 0.042$	1	0.5
1.3	Ceiling – $U \leq 0.020$ Windows – $U \leq 0.25$ (area-weighted average for the window package)	0.5	0.5
1.4	Proposed thermal envelope UA is 15% lower than the UA when calculated in Table R402.1.4.	1.5	1.0
1.5	Windows – $U \leq 0.24$ (area-weighted average for the window package)	0.5	0.5
1.6	The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding two air changes per hour in accordance with the requirements of R402.4.1.2. All whole house ventilation requirements as determined by Section M1507.3 of the International Residential Code shall be met with a high efficiency fan (maximum 0.35 Watt/cfm), not interlocked with the furnace fan. Ventilation systems using a furnace with a variable speed fan (not a multi-speed fan) are allowed, provided that they are	0.5	0.5

	<p>controlled to operate at the lowest speed required to provide adequate ventilation in ventilation-only mode.</p> <p>To qualify to claim this credit, the drawings shall specify the option being selected and shall specify the maximum tested building air leakage and shall show the qualified ventilation system.</p>		
1.7	<p>The <i>building</i> or <i>dwelling unit</i> shall be tested and verified as having an air leakage rate not exceeding two air changes per hour in accordance with the requirements of R402.4.1.2.</p> <p>All whole house ventilation requirements as determined by Section M1507.3 of the International Residential Code shall be met with a heat recovery ventilation system (HRV) system with a minimum sensible heat recovery efficiency (SRE) of 0.80 and high efficiency fans (maximum of 0.75 Watts/cfm combined).</p> <p>To qualify to claim this credit, the drawings shall specify the option being selected and shall specify the maximum tested building air leakage and shall show the heat recovery ventilation system.</p>	1.0	1.0
High efficiency equipment and power generation options			
2.1	<p>The building shall be heated by one of the following sources:</p> <ul style="list-style-type: none"> <li>Gas, propane or oil-fired furnace with a minimum AFUE of 94%</li> <li>Gas, propane or oil-fired boiler with a minimum AFUE of 94%</li> <li>Air-source heat pump with a minimum HSPF of 9.0</li> <li>Closed-loop ground source heat pump with a minimum COP of 3.3</li> </ul> <p>To qualify to claim this credit, the building permit drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</p>	1.5	1.0
2.2	<p>Provide the primary (largest) zone(s) of the building with a least one ductless or ducted mini-split heat pump system having a minimum HSPF of 9.0. The unit shall not have integrated backup resistance heat, and the unit (or units, if more than one is installed in the building) shall be sized to have capacity to meet no more than 125% of the building design heat loss rate at outdoor design temperature condition..</p> <p>To qualify to claim this credit, the drawings shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency.</p>	0.5	1.0
2.3	<p>Natural gas or propane water heating with minimum UEF of 0.90, or Heat Pump Water Heater with a minimum UEF of 2.0. Installations of on-demand natural gas or propane water heaters shall not include any buffer tank or hot water storage capacity outside the water heater itself.</p> <p>To qualify to claim this credit, the drawings shall specify the option being selected and shall specify the water heater equipment type and the minimum equipment efficiency.</p>	0.5	1.5
2.4	<p>Natural gas or propane water heating with minimum UEF of 0.97, or Heat Pump Water Heater with minimum UEF of 2.6. Installations of on-demand natural gas or propane water heaters shall not include any buffer tank or hot water storage capacity outside the water heater itself.</p> <p>To qualify to claim this credit, the drawings shall specify the option being selected and shall specify the water heater equipment type and the minimum equipment efficiency.</p>	1.0	2.0
2.5	<p>Minimum 1 kW of photovoltaic power or wind power.</p> <ul style="list-style-type: none"> <li>For each 1 kW of electrical generation per housing unit provided by on-site wind or solar equipment a 1.0 credit shall be allowed, up to 2 credits. Generation/capacity shall be calculated as follows: For solar electric systems, the design shall be demonstrated to meet this requirement using the</li> </ul>	1.0/kW/housing unit (max 2 credits)	1.0/kW/housing unit (max 2 credits)

	<p>National Renewable Energy Laboratory calculator PVWATTS. Documentation of solar access shall be included on the plans.</p> <ul style="list-style-type: none"> <li>For wind generation projects designs shall document annual power generation based on the following factors: The wind turbine power curve; average annual wind speed at the site; frequency distribution of the wind speed at the site and height of the tower.</li> </ul> <p>To qualify to claim this credit, the drawings shall specify the option being selected and shall show the photovoltaic or wind turbine equipment type, provide documentation of solar and wind access, and include a calculation of the rated capacity and estimated annual energy production.</p>		
2.6	<p>Minimum of 40 ft<sup>2</sup> of gross collector area for solar water heating. To qualify to claim this credit, the drawings shall specify the option being selected and shall provide a calculation of the minimum energy savings.</p>	1.0/housing unit	1.0/housing unit

### Addition of New Section R408 (Passive House)

#### Section R408 Passive House

**R408.1 General.** Buildings shall comply with either Section 408.1.1 or 408.1.2, and shall comply with Section 408.2.

**408.1.1. Passive House Institute US (PHIUS) Approved Software. PHIUS+2015.** Passive Building Standard - North America, where Specific Space Heat Demand, as modeled and field-verified by a Certified Passive House Consultant, is less than or equal to 9kBTU/ft<sup>2</sup>/year. The dwelling unit shall also be tested with a blower door and found to exhibit no more than 0.05 CFM50/ft<sup>2</sup> or 0.08 CFM75/ft<sup>2</sup> of air leakage.

**408.1.2 Passive House Institute (PHI) Approved Software.** Passive House Institute: Low Energy Building Standard, version 9f, where Specific Space Heating or Cooling Demand is less than or equal to 9.5 kBTU/ft<sup>2</sup>/year, as modeled and field-verified by a Certified Passive House Consultant. The dwelling unit shall also be tested with a blower door and found to exhibit no more than 1.0 air changes per hour.

#### R408.2 Documentation

1. If using the PHIUS software:
  - a. Prior to the issuance of a building permit, the following items must be provided to the Building Official:
    - i. A list of compliance features; and
    - ii. A statement that the estimated Specific Space Heat Demand is “based on plans.”
  - b. Prior to the issuance of a certificate of occupancy, the following item must be provided to the building official:
    - i. A copy of the final report, submitted on a form that is approved to document compliance with PHIUS+ 2015 standards. Said report must indicate that the finished building achieves a Certified Passive House Consultant verified Specific Space Heat Demand of less than or equal to 9 kBTU/ft<sup>2</sup>/year.
2. If using the PHI software:

- a. Prior to the issuance of a building permit, the following items must be provided to the Building Official:
  - i. A list of compliance features; and
  - ii. A statement that the estimated Specific Space Heating and Cooling Demand is “based on plans.”
- b. Prior to the issuance of a certificate of occupancy, the following item must be provided to the building official:
  - i. A copy of the final report, submitted on a form that is approved to document compliance with PHI standards. Said report must indicate that the finished building achieves a Certified Passive House Consultant verified Specific Space Heating or Cooling Demand is less than or equal to 9.5 kBTU/ft<sup>2</sup>/year.

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