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COMMISSIONER, DIVISION OF
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BOARD OF BUILDING REGULATIONS AND STANDARDS
NOTICE OF MEETING

In accordance with the provisions of G.L. c. 30A § 20, notice is hereby given that the Board of Building Regulations and Standards (BBRS) will convene a regular monthly meeting on:

February 5, 2019 @ 10:00 a.m. until approximately 1 p.m.

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Division of Professional Licensure

1000 Washington Street – Boston 02118

Posted on January 30, 2019

It is anticipated that the topics shown below will be discussed at the aforementioned meeting:

AGENDA

Roll Call, by BBRS Chair:

John Couture, Chair	<input type="checkbox"/> present	<input type="checkbox"/> absent	Robert Anderson, or designee	<input type="checkbox"/> present	<input type="checkbox"/> absent
Kerry Dietz, Vice Chair	<input type="checkbox"/> present	<input type="checkbox"/> absent	Peter Ostroskey, or designee	<input type="checkbox"/> present	<input type="checkbox"/> absent
Richard Crowley, Second Vice Chair	<input type="checkbox"/> present	<input type="checkbox"/> absent	Michael McDowell	<input type="checkbox"/> present	<input type="checkbox"/> absent
Steve Frederickson	<input type="checkbox"/> present	<input type="checkbox"/> absent	Susan Gleason	<input type="checkbox"/> present	<input type="checkbox"/> absent
Kevin Gallagher	<input type="checkbox"/> present	<input type="checkbox"/> absent	Lisa Davey	<input type="checkbox"/> present	<input type="checkbox"/> absent
Cheryl Lavalley	<input type="checkbox"/> present	<input type="checkbox"/> absent			

- Review\Vote** approval of January 8, 2019 BBRS draft meeting minutes.
- Review\Vote** approval BOCC draft meeting minutes (*None this month*).
- Review** status of Town of Douglas building code enforcement official appointment.
- Review** the 2018 International Energy Conservation Code (IECC) as modified by Massachusetts proposed amendments, inclusive of the Stretch Energy Code, in accordance with Massachusetts General Law (MGL) c143, §94(o). The 2018 IECC may be viewed @ <https://codes.iccsafe.org/content/IECC2018P2> and proposed Massachusetts final amendments are attached to this agenda.
- Discuss** progress relating to the next edition of 780 CMR.
 - Coastal Zone Subgroup
 - Building Official Certification Committee (BOCC)
 - Others as necessary
- Discuss** progress of Manufactured Buildings Study Group.
- Discuss** approval of new CSLs issued in the month of January, 2019.

8. **Discuss\Vote**

CSL Average Passing Score\Medical\Military\Age or Continuing Education Requirements.

- Medical Thomas Conley – CS-052433
- Military None this month.
- Age None this month.
- Other None this month.

9. **Discuss** other matters not reasonably anticipated 48 hours in advance of meeting.

10. **Executive Session (Closed Session)** – Discuss strategy with respect to pending litigation per M.G.L. c. 30A, s. 21.

**Commercial Code
Proposed Amendments**

MA 9th edition amendments to the IECC 2018 Commercial Chapter 13 – Draft for Public Hearing

COMMERCIAL MA AMENDMENTS (780CMR Chapter 13)

Red line refers to new MA ninth edition amendments

Blue line refers to existing MA ninth edition amendments rolled over from the IECC2015

Black line refers to existing IECC2018 language

Red italics describe the actions made by MA amendments

Italics refer to defined terms in the IECC2018 or other I-codes

Strikeout and **blue-strikeout** refers to language removed from the IECC2018 or from the MA amendments to the IECC2015

CHAPTER 1 [CE]

SCOPE AND ADMINISTRATION

SECTION C103

CONSTRUCTION DOCUMENTS

C103.2 Amend the following:

C103.2 Information on Construction Documents. Construction documents shall be drawn to scale on suitable material. Electronic media documents are permitted to be submitted where *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the *building*, systems and equipment as herein governed. Details shall include the following as applicable:

1. Insulation materials and their *R*-values.
2. Fenestration *U*-factors and *solar heat gain coefficients* (SHGC).
3. Area-weighted *U*-factor and *solar heat gain coefficients* (SHGC) calculations.
4. Mechanical system design criteria.
5. Mechanical and service water-heating systems and equipment types, sizes and efficiencies.
6. Economizer description.
7. Equipment and system controls
8. Fan motor horsepower (hp) and controls.
9. Duct sealing, duct and pipe insulation and location.
10. Lighting fixture schedule with wattage and control narrative.
11. Location of daylight zones on floor plans.
12. Air sealing details
13. Solar Ready roof zone in accordance with Appendix CA
14. EV Ready Spaces locations in accordance with C405.9

CHAPTER 2 [CE]

DEFINITIONS

C202 GENERAL DEFINITIONS

Add the following definitions:

ELECTRIC VEHICLE. An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current.

Informational note: defined as in 527 CMR 12 section 625.2.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE): The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the *Electric Vehicle* connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the *Electric Vehicle*.

Informational note: defined as in 527 CMR 12 section 625.2.

ELECTRIC VEHICLE CHARGING SPACE (“EV READY SPACE”): A designated parking space which is provided with one dedicated 50-ampere branch circuit for *EVSE* servicing *Electric Vehicles*.

CHAPTER 13: COMMERCIAL ENERGY EFFICIENCY**1301.1.1 Amend the following section:**

[E] 1301.1.1 Criteria. Buildings shall be designed and constructed in accordance with the 20152018 International Energy Conservation Code (IECC) with Massachusetts Amendments contained herein. These amendments are intended to expressly apply to the IECC, and are also to applicable, in intent, to ANSI/ASHRAE/IESNA 90.1.

Exception. Temporary structures, as regulated by Section 3103, do not need to comply with the building envelope requirements of Chapter 13.

C401.2 Amend the following section:

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

1. The requirements of ANSI/ASHRAE/IESNA 90.1-2016, as modified by ~~C401.2.2 and C402.3, C405.3, C405.4, C405.9 and C406 if following Appendix G.~~
 - a. If following Appendix G then use ANSI/ASHRAE/IESNA 90.1-2016 as modified by C401.2, C402.1.5, C402.3, C405.3, C405.4, C405.9 and C406
 - b. If following Stretch energy code Section AA103.2 then use ANSI/ASHRAE/IESNA 90.1-2013 Appendix G as modified by C401.2, C402.1.5, C402.3, C405.3, C405.4, C405.9 and C406)
2. The requirements of Sections C402 through C405 and C408. In addition, commercial buildings shall comply with Section C406 and tenant spaces shall comply with Section C406.1.1.
3. The requirements of Sections **C407, C402.3, C405** and C408. ~~C402.5, C403.2, C403.3 through C403.3.2, C403.4 through C403.4.2.3, C403.5.5, C403.7, C403.8.1 through~~

C403.8.4, C403.10.1 through C403.10.3, C403.11, C403.12, C404, C405, C407 The building energy cost shall be equal to or less than 85 percent of the standard reference design building.

4. Residential use buildings up to 5 stories may elect to comply with the energy provisions of Section R406 found in the Residential Volume of 780 CMR, provided all units are separately rated, separately metered, individually heated and cooled, and have kitchens.

C401.2.3 Amend the following section:

C401.2.3 Performance rating Method for Source Energy. Add exception to ANSI/ASHRAE/IESNA 90.1 APPENDIX G PERFORMANCE RATING METHOD, Section G1.1

Exception:

When Appendix G is used for the comparison of building energy consumption only, the comparison may be performed on site energy and/or on a source energy basis.

C401.2.3.1 Source Energy Method. For the purpose of quantifying the projected Source Energy consumption of a building the Site to Source Fuel Conversion factors in Table 401.2.2 shall apply.

TABLE 401.2.3 SITE TO SOURCE FUEL CONVERSION FACTORS

Load Type	Factor
Electricity (Grid Purchase) power use at the utility meter	3.01 2.80
Electricity (On-Site Solar or Wind)	1.00
Natural Gas	1.095
Fuel Oil	1.013
LPG-Propane & Liquid Propane	1.012
Purchased District Heating	
Hot Water	1.2035
Steam	1.2045
Purchased District Cooling	0.919
Fossil fuels not listed	1.1
Purchased Combined Heat and Power District Heat	*

*A source fuel conversion for purchased district heat supplied by a combined heat and power central utility will be published by the MA Dept. of Energy Resources on a per district system basis.

C401.2.3.2 Approved software for source energy calculation with combined heat and power.

1. Determination of the source energy consumption and usage intensity when using purchased combined heat and power district heat shall be performed as an exceptional calculation using the Department of Energy Resources (DOER) approved Excel worksheet.

2. Determination of the source energy consumption and usage intensity for heat generated by a combined heat and power system located on-site shall be performed using software meeting the requirements of ASHRAE 90.1-2013 Normative Appendix G Performance Rating Method, Section G 2.2 Simulation Program, and has an explicitly stated capability to determine both the site and source energy use intensity for combined heat and power systems without the requirement for exceptional calculations as defined in ASHRAE 90.1 Appendix G Section G2.5.

C401.2.4 Add the following section:

C401.2.4 Performance rating Method Baseline Building Vertical Fenestration.

Add the following row to ASHRAE 90.1 Normative Appendix G Performance Rating Method, Section G Table G3.1.1-1 and add Footnote b.

**TABLE G3.1.1-1 BASELINE BUILDINGS VERTICAL FENESTRATION
PERCENTAGE OF GROSS ABOVE-GRADE-WALL AREA**

Building Area Types	Baseline Building Gross Above-Grade-Wall Area
Multifamily	24%

Note b: In both Baseline and Proposed buildings, above grade wall area shall not include wall area associated with mechanical enclosures above the primary roof assembly.

C402.1.5 Component performance alternative. Building envelope values and fenestration areas determined in accordance with Equation 4-2 shall be an alternative to compliance with the U-, F- and C-factors in Tables C402.1.4 and C402.4 and the maximum allowable fenestration areas in Section C402.4.1. Fenestration shall meet the applicable SHGC requirements of Section C402.4.3. **Buildings following ANSI/ASHRAE/IESNA 90.1-2013 Appendix G or 90.1-2016 Appendix G shall comply with this section.**

C402.2.4 Delete the Exception

~~**Exception:** Where the slab on grade floor is greater than 24 inches (61cm) below the finished exterior grade, perimeter insulation is not required~~

C402.3 Replace section as follows:

C402.3 Rooftop solar readiness (Mandatory). Follow IECC2018 Appendix CA: Solar-ready Zone – Commercial Provisions

~~**C402.3 Rooftop solar readiness (Mandatory).** New low-rise commercial buildings and additions of less than 4 stories above grade, with not less than 2,400 square feet of roof area that is either flat or oriented between 110 degrees and 270 degrees of true north shall comply with Sections C402.3.1 through C402.3.6.~~

Exceptions:

- ~~1. Assembly Group A-2 and A-3, and High Hazard Group H buildings.~~

- ~~2. Buildings with a permanently installed on-site renewable energy system.~~
- ~~3. Flat roof areas designed for rooftop vehicle parking facilities.~~
- ~~4. Buildings with a solar ready zone that is shaded for more than 50 percent of daylight hours annually.~~
- ~~5. Buildings and structures as designed and shown in construction documents that do not meet the conditions for a solar ready zone area are exempt from the requirements of C402.3.~~

~~**C402.3.1 Construction document requirements for solar ready zone.**~~

~~Construction documents shall indicate the solar ready zone where applicable.~~

~~**C402.3.2 Solar ready zone area.** The total solar ready zone area shall consist of an area not less than 1,600 square feet, or 50% of the roof area that is either flat or oriented between 110 degrees and 270 degrees of true north, exclusive of mandatory access or set back areas as required by the MA Fire Code.~~

~~**C402.3.3 Obstructions.** Solar ready zones shall consist of an area free from obstructions, including but not limited to vents, chimneys, and roof-mounted equipment.~~

~~**NOTE:** Nothing in C402.3.3 shall require any construction documents to be redesigned or reconfigured so as to create a solar ready zone area.~~

~~**C402.3.4 Roof load documentation.** The structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents.~~

~~**C402.3.5 Interconnection pathway.** Construction documents shall indicate pathways for routing of conduit or plumbing from the solar ready zone to the electrical service panel or service hot water system.~~

~~**C402.3.6 Electrical service reserved space.** The main electrical service panel shall have a reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and shall be labeled "For Future Solar Electric."~~

C402.4.1 Amend the following:

C402.4.1 Maximum Area. The vertical fenestration area, not including opaque doors and opaque spandrel panels, shall be not greater than 30 percent of the gross above-grade wall area. **Above-grade wall area shall not include wall area for mechanical system enclosures that are above the primary roof assembly.** The skylight area shall not be greater than 3 percent of the gross roof area.

C402.5.1.2. Amend the following sections:

C402.5.1.2 Air barrier compliance options. A continuous air barrier for the opaque building envelope shall comply with Section C402.5.1.2.1 or C402.5.1.2.2

C402.5.1.2.1 Materials. Materials with an air permeability not greater than 0.004 cfm/ft² under a pressure differential of 0.3 inch water gauge (75 Pa) when tested in accordance with ASTM E 2178 shall comply with this section. Materials in Items 1 through ~~16~~15 shall be deemed to comply with this section, provided joints are sealed and materials are installed as air barriers in accordance with the manufacturer's instructions.

~~16. Solid or hollow masonry constructed of clay or shale masonry units.~~

C402.5.1.2.2 Assemblies. Assemblies of materials and components with an average air leakage not greater than 0.04 cfm/ft² under a pressure differential of 0.3 inch of water gauge (75 Pa) when tested in accordance with ASTM E 2357, ASTM E 1677 or ASTM E 283 shall comply with this section. Assemblies listed in Items 1 through ~~32~~ shall be deemed to comply, provided joints are sealed and the requirements of Section C402.5.1.1 are met.

~~2. Masonry walls constructed of clay or shale masonry units with a nominal width of 4 inches (102 mm) or more.~~

C402.6 Add the following section:

C402.6 Approved calculation software tools. The following software tools are sufficient to demonstrate compliance with Section C401.2 **prescriptive** options 1 or 2:

1. COMcheck: **COMcheck-Web or COMcheck for Windows Version 4.1.0-6**, or later. Can be accessed at: <https://www.energycodes.gov/>
2. Any other software tool approved **for this purpose** by the Board of Building Regulations and Standards.

C405.2.2.1 Amend the Section as follows:

C405.2.2.1 Time-switch control function. Each space provided with *time-switch controls* shall be provided with a ~~manual control for~~ light reduction **control** in accordance with Section C405.2.2.2. Time-switch *controls* shall **comply** ~~include an override~~ switching device that complies with the following:

C405.2.3 Amend the Section as follows:

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~~150 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~~150 watts of *general lighting* within toplit zones complying with Section C405.2.3.3.

C405.3.2 Amend Table C405.3.2(1) as follows (retaining all footnotes unamended):

**TABLE C405.3.2(1)
INTERIOR LIGHTING POWER ALLOWANCES: BUILDING AREA METHOD**

BUILDING AREA TYPE	LPD (w/ft ²)
Automotive Facility	0.71
Convention Center	0.76 0.70
Courthouse	0.90 0.81
Dining: bar lounge/leisure	0.90 0.73
Dining: cafeteria/fast food	0.79
Dining: family	0.78
Dormitory	0.61
Exercise center	0.65
Fire station	0.53
Gymnasium	0.68
Health care clinic	0.82
Hospital	1.05
Hotel/Motel	0.75 0.63
Library	0.78
Manufacturing facility	0.90 0.81
Motion picture theater	0.83 0.68
Multifamily	0.68 0.55
Museum	1.06 0.86
Office	0.79 0.71
Parking garage	0.15
Penitentiary	0.75 0.70
Performing arts theater	1.18 0.95
Police station	0.80 0.72
Post office	0.67 0.62
Religious building	0.94 0.85
Retail	1.06 0.86
School/university	0.81 0.73
Sports arena	0.87
Town hall	0.80 0.72
Transportation	0.61 0.55

Warehouse	0.48
Workshop	0.90

Amend Table C405.3.2(2) as follows (retaining all footnotes unamended):

TABLE C405.3.3(2)
INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD

COMMON SPACE TYPES	LPD (watts/ sq.ft)
Atrium	
Less than 40 feet in height	0.03 per foot in total height 0.57
Greater than 40 feet in height	0.40 + 0.02 per foot in total height 0.70
Audience Seating Area	
In an auditorium	0.63 0.61
In a convention center	0.82
In a gymnasium	0.65 0.23
In a motion picture theater	1.14 0.27
In a penitentiary	0.28 0.67
In a performing arts theater	2.03 1.16
In a religious building	1.53 0.72
In a sports arena	0.43 0.33
Otherwise	0.43 0.23
Banking activity area	0.86 0.61
Breakroom (see Lounge/breakroom)	
Classroom/lecture hall/training room	
In a penitentiary	1.34 1.38
Otherwise	0.96 0.78
Computer room	1.33 1.00
Conference/meeting/multipurpose room	1.07 0.97
Copy/print room	0.56
Corridor	
In a facility for the visually impaired (and not used primarily by the staff)	0.92 0.71
In a hospital	0.92 0.71
In a manufacturing facility	0.29
Otherwise	0.66 0.60
Courtroom	1.39 1.25
Dining area	
In bar/lounge or leisure dining	0.93 0.86
In cafeteria or fast food dining	0.63 0.40
In a facility for the visually impaired (and not used primarily by the staff)	2.00 1.38
In family dining	0.71 0.60
In a penitentiary	0.96 0.42

Otherwise	0.63 0.43
Electrical/mechanical room	0.43 0.42
Emergency vehicle garage	0.41 0.52
Food preparation area	1.06 1.29
Guestroom	0.77 0.41
Laboratory	
In or as a classroom	1.20 1.17
Otherwise	1.45
Laundry/washing area	0.43 0.59
Loading dock, interior	0.58 0.88
Lobby	
For an elevator	0.68 0.71
In a facility for the visually impaired (and not used primarily by the staff)	2.03 2.49
In a hotel	1.06 0.51
In a motion picture theater	0.45 0.23
In a performing arts theater	1.70 1.25
Otherwise	1.00 1.11
Locker room	0.48 0.52
Lounge/breakroom	
In a healthcare facility	0.78 0.42
Otherwise	0.62 0.59
Office	
Enclosed ≤ 250 sf	0.93 0.74
Enclosed ≥ 250 sf	0.66
Open plan	0.81 0.61
Parking area, interior	0.14 0.15
Pharmacy area	1.34 1.90
Restroom	
In a facility for the visually impaired (and not used primarily by the staff)	0.96 1.26
Otherwise	0.85 0.75
Sales area	1.22 1.12
Seating area, general	0.42 0.23
Stairway (see Space containing stairway)	
Stairwell	0.58 0.49
Storage room	0.46
Vehicular maintenance area	0.56 0.60
Workshop	1.14 1.26
BUILDING TYPE SPECIFIC SPACE TYPES	
Automotive (see Vehicular maintenance area)	
Convention Center—exhibit space	0.88 0.85
Dormitory—living quarters	0.54 0.84
Facility for the visually impaired	
In a chapel (and not used primarily by the staff)	1.06 0.70

In a recreation room (and not used primarily by the staff)	1.80 1.77
Fire Station—sleeping quarters	0.20 0.23
Gymnasium/fitness center	
In an exercise area	0.50 0.90
In a playing area	0.82 0.85
Healthcare Facility	
In an exam/treatment room	1.68 1.40
In an imaging room	1.06 0.85
In a medical supply room	0.54 0.62
In a nursery	1.00 1.37
In a nurse's station	0.81 1.11
In an operating room	2.17 2.26
In a patient room	0.62 0.68
In a physical therapy room	0.84 0.91
In a recovery room	1.03 1.25
Library	
In a reading area	0.82 0.96
In the stacks	1.20 1.18
Manufacturing facility	
In a detailed manufacturing area	0.93 0.80
In an equipment room	0.65 0.76
In an extra-high-bay area (greater than 50' floor-to-ceiling height)	1.05 1.42
In a high-bay area (25-50' floor-to-ceiling height)	0.75 1.24
In a low-bay area (less than 25' floor-to-ceiling height)	0.96 0.86
Museum	
In a general exhibition area	1.05 0.31
In a restoration room	0.85 1.10
Performing arts theater—dressing room	0.36 0.41
Post office—sorting area	0.68 0.76
Religious buildings	
In a fellowship hall	0.55 0.54
In a worship/pulpit/choir area	1.53 0.85
Retail facilities	
In a dressing/fitting room	0.50 0.51
In a mall concourse	0.90 1.03
Sports arena—playing area	
For a Class I facility	2.47 2.94
For a Class II facility	1.96 2.01
For a Class III facility	1.70 1.30
For a Class IV facility	1.13 0.86
Transportation facility	
In a baggage/carousel area	0.45 0.39
In an airport concourse	0.31 0.25
At a terminal ticket counter	0.62 0.51

Warehouse—storage area	
For medium to bulky, palletized items	0.35 0.33
For smaller, hand-carried items	0.69

C405.4.2 Amend Table C405.4.2(1) as follows, including deletion of the “Lighting Zone 4” row:

TABLE C405.4.2(1) EXTERIOR LIGHTING ZONES

LIGHTING ZONE	DESCRIPTION
1	Developed areas of national parks, state parks, forest land, and rural areas
2	Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited nighttime use and residential mixed-use areas
3	All other areas not classified as lighting zone 1; or 2 or 4
4	High activity commercial districts in major metropolitan areas as designated by the local land use planning authority

Amend Table C405.4.2(2) as follows (delete the “Zone 4” column without substitution):

**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
Uncovered Parking Areas				
Parking areas and drives	0.03 W/ft ²	0.04 W/ft ²	0.06 W/ft ²	0.08 W/ft²
Building Grounds				
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 ²	0.10 W/ft ²	0.11 W/ft ²	0.14 W/ft²
Dining areas	0.65 W/ft ²	0.65 W/ft ²	0.75 W/ft ²	0.95 W/ft²
Stairways	0.6 W/ft ²	0.7 W/ft ²	0.7 W/ft ²	0.7 W/ft²
Pedestrian tunnels	0.12 W/ft ²	0.12 W/ft ²	0.14 W/ft ²	0.21 W/ft²
Landscaping	0.03 W/ft ²	0.04 W/ft ²	0.04 W/ft ²	0.04 W/ft²
Building Entrances and Exits				
Pedestrian and vehicular entrances and exits	14 W/linear foot of opening	14 W/linear foot of opening	21 W/linear foot of opening	21 W/linear foot of opening
Entry canopies	0.02 W/ft ²	0.25 W/ft ²	0.4 W/ft ²	0.4 W/ft²
Loading docks	0.35 W/ft ²	0.35 W/ft ²	0.35 W/ft ²	0.35 W/ft²

Sales Canopies				
Free-standing and attached	0.04 W/ft ²	0.04 W/ft ²	0.6 W/ft ²	0.7 W/ft ²
Outdoor Sales				
Open areas (including vehicle sales lots)	0.02 W/ft ²	0.02 W/ft ²	0.35 W/ft ²	0.05 W/ft ²
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

Amend Table C405.4.2(3) as follows (delete the “Zone 4” column without substitution):

**TABLE C405.4.2(3)
INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS**

	LIGHTING ZONES			
	Zone 1	Zone 2	Zone 3	Zone 4
Building facades	No allowance	0.075 W/ft ² of gross above-grade wall area	0.113 W/ft ² of gross above-grade wall area	0.15 W/ft ² of gross above-grade wall area
Automated teller machines (ATM) and night depositories	135 W per location plus 45 W per additional ATM per location			
Uncovered entrances and gatehouse inspection stations at guarded facilities	0.5 W/ft ² of area			
Uncovered loading areas for law enforcement, fire, ambulance, and other emergency service vehicles	0.35 W/ft ² of area			
Drive-up windows and doors	200 W per drive through			
Parking near 24-hour retail entrances	400 W per main entry			

C405.9 Replace with the following section:

C405.9 Electric Vehicle Charging Spaces (“EV Ready Spaces”) (Mandatory). Group A-1, B, E, I, M and R buildings with four or more passenger vehicle parking spaces on the premises shall provide *EV Ready Spaces* for a percentage of parking spaces not less than:

1. 5% of first 80 spaces,
2. 3% of all spaces more than 80.
3. 20% of spaces associated with R-2 buildings

The branch circuit shall be identified as “EV READY” in the service panel or subpanel directory, and the termination location shall be marked as “EV READY”. The circuit shall terminate in a

NEMA receptacle or a Society of Automotive Engineers (SAE) standard J1772 electrical connector.

Exceptions:

1. Parking spaces and garage spaces intended exclusively for storage of vehicles for retail sale or vehicle service.
2. This requirement will be considered met if all spaces which are not EV Ready are separated from the meter by a public right-of-way.
3. Any 50-ampere branch circuit may be replaced by 3 or more "EV READY" labelled 20-ampere branch circuits and terminations where additional spaces are available.

C406.1 Amend the following section:

C406.1 Requirements. Buildings following either ASHRAE 90.1 or IECC shall comply with at least ~~two~~ three of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power density system in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8
8. Reduced air-infiltration in accordance with Section C406.9.
9. Renewable space heating in accordance with Section C406.10.
10. Wood-frame construction in accordance with Section C406.11

~~**Exception 1:** Buildings in municipalities not served by a participating Mass Save investor owned gas or electric utility provider shall comply with at least one of the requirements in Section C406.1.~~

~~**Exception 2:** Buildings being designed utilizing ANSI/ASHRAE/IESNA 90.1—2013 must comply with Item 2 of C406.1 as well as at least one of the remaining items listed in C406.1.~~

C406.3 Amend the following section:

C406.3 Reduced lighting power. The total connected interior lighting power calculated in accordance with Section C405.3.1 shall be less than 90 percent of the total lighting power allowance calculated in accordance with Section C405.3.2. **The total connected exterior lighting power calculated in accordance with Section C405.4.1 shall be less than 90 percent of the total lighting power allowance calculated in accordance with Section C405.4.2.**

C406.4 Delete the individual user control requirement:

C406.4 Enhanced digital lighting controls. Interior lighting in the building shall have the

following enhanced lighting controls that shall be located, scheduled and operated in accordance with Section C405.2.2.

1. Luminaires shall be configured for continuous dimming.
2. Luminaires shall be addressed individually. Where individual addressability is not available for the luminaire class type, a controlled group of not more than four luminaries shall be allowed.
3. Not more than eight luminaires shall be controlled together in a *daylight zone*.
4. Fixtures shall be controlled through a digital control system that includes the following function:
 - 4.1. Control reconfiguration based on digital addressability.
 - 4.2. Load shedding.
 - 4.3. ~~Individual user control of overhead general illumination in open offices.~~
 - 4.3.4. Occupancy sensors shall be capable of being reconfigured through the digital control system.
5. Construction documents shall include submittal of a Sequence of Operations, including a specification outlining each of the functions in Item 4.
6. Functional testing of lighting controls shall comply with Section C408.

C406.5 Amend the following section:

C406.5 On-site renewable energy. Total minimum ratings of on-site renewable energy systems shall comply with one of the following:

1. Not less than 1.71 Btu/hr per square foot (**0.50 W/ft²** or 5.4 W/m²) of conditioned floor area.
2. Not less than 3 percent of the energy used within the building for building mechanical and service water heating equipment and lighting regulated in Chapter 4.
3. **Provide not less than 65 percent of the total annual energy used within the building for building space and service water heating with biomass fuel using direct vented combustion mechanical equipment rated at a minimum of 80 AFUE. The biomass fuel shall meet the eligible fuel and emission criteria under M.G.L. c. 25A, §11F 1/2 (Massachusetts alternative energy portfolio standard).**
4. **Provide not less than 65 percent of the total annual energy used within the building for building space and service water heating using a geothermal heat pump system with a coefficient of performance of not less than 4.**

C406.7.1 Amend the following Section:

C406.7.1 Load fraction.

The building service water-heating system shall have one or more of the following that are sized to provide not less than 60 percent of the building's annual hot water requirements, or sized to provide 100 percent of the building's annual hot water requirements if the building shall otherwise comply with Section C403.9.5:

1. Waste heat recovery from service hot water, heat-recovery chillers, building

- equipment, or process equipment.
2. *On-site renewable energy* water-heating systems.
 3. **Electric air source heat pump water-heating.**

C406.10 through C406.11 Add the following sections:

C406.10 Renewable space heating. All space heating shall be provided with cold-climate air source heat pumps having rated coefficient of performance (COP) of at least 1.75 at 5 degrees Fahrenheit source air.

C406.11 Wood-frame construction. In buildings 5 stories or more above grade, all building framing is comprised of wood members.

C407 Revise and replace this section as follows:

Section C407 ~~Total~~ Building Performance Certification Methods.

C407.1 Scope. This section establishes criteria for compliance using ~~total~~ building performance **certification methods**. ~~The following systems and loads shall be included in determining the total building performance: heating systems, cooling systems, service water heating, fan systems, lighting power, receptacle loads and process loads.~~ **The following sections C407.1.1 or C407.1.2 are approved performance methods to demonstrate compliance with Section C407 without calculation of a standard reference design:**

Exception: Energy used to recharge or refuel vehicles that are used for on-road and off-site transportation purposes, **or energy losses from use of behind-the-meter energy storage, should not be included in determining building performance.**

C407.1.1 Energy Rating Index (ERI). ~~RESNET Approved Software for Home Energy Rating System (HERS).~~ For residential units within a building up to 5 stories above grade plane, and with independent unit-level heating and cooling systems, a HERS rater verified **Energy Rating Index (ERI)** score of 55 or less for the finished units together with a completed and HERS rater verified ENERGY STAR Thermal Enclosure Checklist may be used.

C407.1.2 Passive House Institute US (PHIUS) or Passive House Institute (PHI) certified. Projects certified as meeting the PHIUS+ 2015 or PHIUS+2018 Passive Building Standard – North America, or newer, demonstrated using approved software by PHIUS, where PHIUS certification is demonstrated by a Certified Passive House Consultant; or, Project certified as meeting Certified Passive House standard using software by PHI, where PHI certification is demonstrated by a Certified Passive House Designer.

C407.2 Revise the section as follows:

C407.2 Mandatory requirements. Compliance with this section requires compliance with Sections ~~C402.3, C402.5, C403.2, C403.3 through C403.3.2, C403.4 through C403.4.2.3, C403.5.5, C403.7, C403.8.1 through C403.8.4, C403.10.1 through C403.10.3, C403.11, C403.12, C404 and C405.~~

C407.3 Replace this section as follows:

C407.3 ERI-based compliance. Compliance based on an ERI analysis requires that the *rated design* be shown to have an ERI less than or equal to 55 when compared to the *ERI reference design* prior to credit for onsite renewable electric generation. The Energy Rating Index (ERI) shall be determined in accordance with RESNET/ICC 301, the ERI Reference Design Ventilation rate shall be in accordance with Equation 4-1.

Ventilation rate, CFM = (0.01 x total square foot area of dwelling unit) + [7.5 x (number of bedrooms + 1)]

(Equation 4-1)

C407.4 Revise this section as follows:

C407.4 Documentation. Documentation verifying that the methods and accuracy of compliance software tools conform to the provisions of this section shall be provided to the ~~code~~*building official, in accordance with Sections C407.4.1 through C407.4.3*

C407.4.1 Compliance software tools. Software tools used for determining ERI shall be Approved Software Rating Tools in accordance with RESNET/ICC 301. Where calculations require input values not specified by Sections R402, R403, R404 and R405, those input values shall be taken from RESNET/ ICC 301. Software tools for determining Passive House certification shall be approved software tools by PHIUS or PHI.

C407.4.2 ERI Documentation. Prior to the issuance of a building permit, the following items must be provided to the Building Official:

1. A HERS compliance report which includes a proposed HERS index score of 55 or lower
2. A description of the unit's energy features
3. A statement that the rating index score is "based on plans"

Prior to the issuance of a certificate of occupancy, the following items must be provided to the Building official:

4. A copy of the final certificate indicating that the HERS rating index score for each unit is verified to be 55 or less
5. A completed HERS rater verified ENERGY STAR Thermal Enclosure Checklist.

C407.4.3 Passive House Documentation. If using PHIUS or PHI Passive House software, prior to the issuance of a building permit, the following items must be provided to the Building Official:

1. A list of compliance features

2. A statement that the estimated Specific Space Heat Demand and other Passive House certification requirements are “based on plans”

Prior to the issuance of a certificate of occupancy, the following item must be provided to the building official:

3. A copy of the final report, submitted on a form that is approved to document compliance with current PHIUS+2015, PHIUS+2018, or PHI standards. Said report must indicate that the finished building achieves a Certified Passive House Consultant-verified Standard.

C407.5 Replace this section as follows:

C407.5 Verification by approved agency. Verification of compliance with Section C407 shall be completed by an *approved* third party. For compliance using an ERI ~~HERS Index rating or Energy Star Homes 3.1~~ certification, verification of compliance shall be completed by the certified HERS rater. For compliance using PHIUS+ 2015, **PHIUS+2018** or PHI software, verification of compliance shall be completed by a certified Passive House consultant.

C407.6 Delete this section

CHAPTER 5 [CE] EXISTING BUILDINGS

SECTION C502 ADDITIONS

C502.2.7 Add the following section

C502.2.7 Electric Vehicle Charging Spaces (“EV Ready Spaces”). The number of *EV Ready Spaces* for the addition shall comply with the requirements for new construction.

Exception

1. Where the existing electric service is not being upgraded and capacity is not available.

SECTION C503 ALTERATIONS

C503.1 Amend as follows:

C503.1 General. Alterations to any building or structure shall comply with the requirements of Section C503, and **Sections C402, C403, C404, C405** of the code for new construction. Alterations shall be such that the existing building or structure is not less conforming to the provisions of this code than the existing building or structure was prior to the alteration. Alterations to an existing building, building system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Alterations shall not create an unsafe or hazardous condition or overload existing building

systems.

Alterations complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, and C404 and C405.

CHAPTER 115: APPENDICES

Appendix AA: Amend as follows:

APPENDIX AA Stretch Energy Code

AA101 Purpose and Adoption. The purpose of the stretch energy code is to provide a more energy efficient code alternative for new buildings. The stretch energy code may be adopted or rescinded by any municipality in the commonwealth in the manner prescribed by law.

AA102 Applicability. Municipalities that have adopted the stretch energy code shall use the energy efficiency requirements of this appendix as provided below. These requirements replace all previous stretch energy code requirements.

AA103 New buildings.

AA 103.1 R-use buildings. In all R-use buildings, of four stories or less above grade plane with one or more *dwelling units*, each *dwelling unit* shall comply with IECC 2015/2018 Section R406 of 780 CMR 51 (Residential Code) as amended and mandatory requirements of Chapter 13 and 51, as applicable.

AA103.2 Large area and high energy use buildings. All buildings over 100,000 sq ft, and new supermarkets, laboratories and conditioned warehouses over 40,000 sq. ft. shall comply with 780 CMR 13 as amended and shall demonstrate energy use per square foot at least 10% below the energy requirements of ANSI/ASHRAE/IESNA 90.1-2013 APPENDIX G (as amended by C401.2, C402.1.5, C402.3, C405.3, C405.4, C405.9 and C406) Performance Rating Method on either a site or source energy basis. The additional Efficiency Package Options selected per C406.1 shall be included in calculating the baseline building performance value.

Exception: Exclusively R-use buildings complying with AA 103.1 *dwelling unit* requirements.

AA103.3 Other new buildings

New buildings not covered in AA103.1 and AA103.2 shall comply with 780 CMR 13 as amended or 780 CMR 51-Chapter 11 as amended as applicable based on the use and occupancy of the building.

AA104 Existing buildings. For alterations, renovations, additions or repairs of existing buildings in these municipalities the energy efficiency requirements of 780 CMR 13 as

amended or 780 CMR 51-Chapter 11 as amended shall be used as applicable based on the use and occupancy of the building.

**Residential Code
Proposed Amendments**

MA 9th edition amendments to the IECC 2018 – Draft for Public Hearing

RESIDENTIAL MA AMENDMENTS (780CMR Chapter 51)

Red line refers to new MA ninth edition amendments

Blue line refers to existing MA ninth edition amendments rolled over from the IECC2015

Black line refers to existing IECC2018 language

Red italics describe the actions made by MA amendments

Italics refer to defined terms in the IECC2018 or other I-codes

Strikeout and **blue-strikeout** refers to language removed from the IECC2018 or from the MA amendments to the IECC2015

CHAPTER 11: ENERGY EFFICIENCY

Add the following sections as follows:

1100.1 Adoption. Buildings shall be designed and constructed in accordance with the *International Energy Conservation Code 2015* **2018** (IECC), as amended by Chapter 11 of 780 CMR 51.00 et seq.

Exception. Applications for building permits and related construction and other documents filed through **July 1, 2019**, may comply either with amended Chapters 11, 51 and Appendix 115.AA of this code effective _____, or with the Ninth Edition **IECC2015** versions of those provisions in effect immediately prior to amendment, but not a mix of both. After **July 1, 2019**, concurrency with the **IECC2015** Edition ends, and all applications for building permits and related construction and other documents must comply with the **IECC2018** and Massachusetts amended provisions only.

[E] 1101.1.1 Criteria. Buildings shall be designed and constructed in accordance with the **2018** *International Energy Conservation Code* (IECC) with Massachusetts Amendments contained herein. ~~These amendments are intended to expressly apply to the IECC, and ANSI/ASHRAE/IESNA 90.1-2013.~~

Exception. Temporary structures, as regulated by Section 3103, do not need to comply with the building envelope requirements of Chapter 51.

CHAPTER 1 [RE]

SCOPE AND ADMINISTRATION

SECTION R103

CONSTRUCTION DOCUMENTS

R103.2 Amend as follows:

R103.2 Information on construction documents. Construction documents shall be drawn to scale on suitable material. Electronic media documents are permitted to be submitted where *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the *building*, systems and equipment as herein governed. Details shall include the following as applicable:

1. Insulation materials and their *R*-values.
2. Fenestration *U*-factors and *solar heat gain coefficients* (SHGC).
3. Area-weighted *U*-factor and *solar heat gain coefficients* (SHGC) calculations.
4. Mechanical system design criteria.
5. Mechanical and service water-heating systems and equipment types, sizes and efficiencies.
6. Equipment and system controls.
7. Duct sealing, duct and pipe insulation and location.
8. Air sealing details.
9. EV Ready Space locations per R404.2
10. Solar-Ready Zone in accordance with Appendix RA

CHAPTER 2 [RE] DEFINITIONS

R202 GENERAL DEFINITIONS

Add the following definitions:

ELECTRIC VEHICLE. An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current.

Informational note: defined as in 527 CMR 12 section 625.2.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the *Electric Vehicle* connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the *Electric Vehicle*.

Informational note: defined as in 527 CMR 12 section 625.2.

ELECTRIC VEHICLE CHARGING SPACE (“EV Ready Space”). A designated parking space which is provided with one dedicated 50-ampere branch circuit for EVSE servicing *Electric Vehicles*.

Amend as follows:

HIGH-EFFICACY LAMPS. Compact fluorescent lamps,

Light-emitting diode (LED) lamps, ~~T-8 or smaller diameter linear fluorescent lamps, or other lamps~~ with an efficacy of not less than the following:

1. 60 lumens per watt for lamps over 40 watts.
2. 50 lumens per watt for lamps over 15 watts to 40 watts.
3. ~~40~~5 lumens per watt for lamps 15 watts or less.

Amend as follows:

RESIDENTIAL BUILDING. For this code, includes detached one- and two-family dwellings and townhouses as well as *Group R-2*, R-3 and R-4 buildings ~~three~~four stories or less in height above grade plane.

CHAPTER 4 [RE] RESIDENTIAL ENERGY EFFICIENCY

SECTION R401 GENERAL

R401 Revise as follows:

R401.1 Scope. This chapter applies to *residential buildings*. Municipalities which have adopted the Stretch Energy Code shall use the energy efficiency requirements of 780 CMR 110 Appendix AA, and chapter 51 or this chapter as applicable.

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

1. Sections R401 through R404 and R407.
2. Section R405 and the provisions of Sections R401 through R404 indicated as "Mandatory."
2. The energy rating index (ERI) approach, or approved alternative energy performance rating method in Section R406 and the provisions of Sections R401 through R404 indicated as "Mandatory."

Qualifying approaches under R406 include the following:

- a. Certified RESNET HERS rating with MA amendments.
- b. Certified Energy Star Homes, Version 3.1.
- c. Certified Passive house performance method.

R401.3 Certificate (Mandatory). A permanent certificate shall be completed by the builder or other *approved* party and posted on a wall in the space where the furnace is located, a utility room or an *approved* location inside the *building*.

Where located on an electrical panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall indicate the predominant *R*-values of insulation installed in or on ceilings, roofs, walls, foundation components such as slabs, *basement walls*, crawl space walls and floors and ducts outside *conditioned spaces*; *U*-factors of fenestration and the *solar heat gain coefficient* (SHGC) of fenestration, and the results from any required duct system and *building* envelope air leakage testing performed on the *building*.

Where there is more than one value for each component, the certificate shall indicate the value covering the largest area. The certificate shall indicate the types and efficiencies of heating, cooling and service water heating equipment. Where a gas-fired unvented room heater, electric furnace or baseboard electric heater is installed in the residence, the certificate shall indicate “gas-fired unvented room heater,” “electric furnace” or “baseboard electric heater,” as appropriate. An efficiency shall not be indicated for gas-fired unvented room heaters, electric furnaces and electric baseboard heaters. **The Certificate shall list the final HERS index score when applicable.**

R402.1.5.1 Add the section as follows:

R402.1.5.1 Approved software for Total UA alternative: The following software is approved for demonstrating Total UA compliance:

REScheck-Web or REScheck for Windows Version 4.6.5 or later, available at <http://www.energycodes.gov/rescheck>

R402.4.1.1 Amend Table R402.4.1.1 as follows:

TABLE R402.4.1.1

AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	AIR BARRIER CRITERIA	INSULATION INSTALLATION CRITERIA
General requirements	A continuous air barrier shall be installed in the building envelope. The exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed.	All insulation shall be installed at Grade I quality in accordance with ICC/RESNET 301. Air-permeable insulation shall not be used as a sealing material.

R403.3.3 Amend as follows:

R403.3.3 Duct testing (Mandatory). Ducts shall be pressure tested to determine air leakage by one of the following methods:

1. Rough-in test: Total leakage shall be measured with a pressure differential of 0.1 inch w.g. (25 Pa) across the system, including the manufacturer’s air handler enclosure if installed at the time of the test. Registers shall be taped or otherwise sealed during the test.
2. Postconstruction test: Total leakage shall be measured with a pressure differential of 0.1 inch w.g. (25 Pa) across the entire system, including the manufacturer’s air handler enclosure. Registers shall be taped or otherwise sealed during the test.

Exceptions:

1. A duct air-leakage test shall not be required where the ducts and air handlers are located entirely within the *building thermal envelope*.
2. A duct air-leakage test shall not be required for ducts serving heat or energy recovery ventilators that are not integrated with ducts serving heating or cooling systems.

Post-construction or rough-in testing and verification shall be done by a HERS Rater, HERS Rating Field Inspector, or an applicable BPI Certified Professional. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*.

R403.6 Revise the section as follows:

R403.6 Mechanical ventilation (Mandatory). The *building* shall be provided with ventilation that complies with the requirements of the *International Residential Code* or *International Mechanical Code*, as applicable, or with other *approved* means of ventilation. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating. Each dwelling unit of a residential building shall be provided with continuously operating exhaust, supply or balanced mechanical ventilation that has been site verified to meet a minimum airflow per:

1. R406.3 for buildings following the ERI approach in R401.2
2. Energy Star Homes' Version 3.1 or
3. ASHRAE 62.2 - 2013 or
4. the following formula for one- and two-family dwellings and townhouses of three or less stories above grade plane:

$$Q = .03 \times CFA + 7.5 \times (N_{br} + 1) - 0.052 \times Q_{50} \times S \times WSF$$

Where: CFA is the conditioned floor area in sq ft

N_{br} is the number of bedrooms

Q_{50} is the verified blower door air leakage rate in cfm measured at 50 Pascals

S is the building height factor determined by this table:

stories above grade plane	1	2	3
S	1.00	1.32	1.55

WSF is the shielded weather factor as determined by this table:

County	WSF
Barnstable	0.60
Berkshire	0.52
Bristol	0.54
Dukes	0.59
Essex	0.58
Franklin	0.52
Hampden	0.49

Hampshire	0.59
Middlesex	0.55
Nantucket	0.61
Norfolk	0.52
Plymouth	0.53
Suffolk	0.66
Worcester	0.59

R403.6.2 through R403.6.6 Add the sections as follows:

R403.6.2 Verification: Installed performance of the mechanical ventilation system shall be tested and verified by a HERS Rater, HERS Rating Field Inspector, or an applicable BPI Certified Professional, and measured using a flow hood, flow grid, or other airflow measuring device in accordance with either RESNET Standard Chapter 8 or ACCA Standard 5.

R403.6.3 Air-moving equipment, selection and installation. As referenced in ASHRAE Standard 62.2-2013, Section 7.1, ventilation devices and equipment shall be tested and certified by AMCA (Air Movement and Control Association) or HVI (Home Ventilating Institute) and the certification label shall be found on the product. Installation of systems or equipment shall be carried out in accordance with manufacturers' design requirements and installation instructions. Where multiple duct sizes and/or exterior hoods are standard options, the minimum size shall not be used.

R403.6.4 Sound Rating. Sound ratings for fans used for whole building ventilation shall be rated at a maximum of 1.0 sone.

Exception: HVAC air handlers and remote-mounted fans need not meet sound requirements. There must be at least 4ft of ductwork between the remote-mounted fan and intake grille.

R403.6.5 Documentation. The owner and the occupant of the dwelling unit shall be provided with information on the ventilation design and systems installed, as well as instructions on the proper operation and maintenance of the ventilation systems. Ventilation controls shall be labeled with regard to their function, unless the function is obvious.

R403.6.6 Air Inlets and Exhausts. All ventilation air inlets shall be located a minimum of 10ft from vent openings for plumbing drainage systems, appliance vent outlets, exhaust hood outlets, vehicle exhaust, or other known contamination sources; and shall not be obstructed by snow, plantings, or any other material. Outdoor forced air inlets shall be covered with rodent screens having mesh openings not greater than ½ inch. A whole house mechanical ventilation system shall not extract air from an unconditioned basement unless approved by a registered design professional. Where wall inlet or exhaust vents are less than seven (7) feet above finished grade in the area of the venting, including but not limited to decks and porches, a metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the vent terminal. The sign shall read, in

print size no less than one-half (1/2) inch in size, "MECH. VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS".

Exceptions:

1. Ventilation air inlets in the wall \geq 3 ft. from dryer exhausts and contamination sources exiting through the roof.
2. No minimum separation distance shall be required between local exhaust outlets in kitchens/bathrooms and windows.
3. Vent terminations that meet the requirements of the National Fuel Gas Code (NFPA 54/ ANSI Z223 .1) or equivalent.

R404.2 Add the section as follows:

R404.2 Electric Vehicle Charging Spaces (“EV Ready Spaces”) (Mandatory). *EV Ready Spaces* shall be provided in accordance with Table R404.2. The branch circuit shall be identified as “EV READY” in the service panel or subpanel directory, and the termination location shall be marked as “EV READY”. The circuit shall terminate in a NEMA receptacle or a Society of Automotive Engineers (SAE) standard J1772 electrical connector.

TABLE R404.2 EV READY SPACE REQUIREMENTS

Type of Building	Number of parking spaces
R-3 (including 1 & 2 family and town homes)	At least 50%
R-2	At least 20%

Exceptions:

1. In no case shall the number of required *EV Ready Spaces* be greater than the number of parking spaces otherwise required by local ordinance.
2. This requirement will be considered met if all spaces which are not *EV Ready* are separated from the premises by a public right-of-way.
3. Any 50-ampere branch circuit may be replaced by 3 or more “EV READY” labelled 20-ampere branch circuits and terminations where additional spaces are available.

R405. Delete and reserve this section

R405. Reserved

R406.1 Revise and add subsection as follows:

R406.1 Scope. This section establishes criteria for compliance using an Energy Rating Index (ERI) analysis, or approved alternative energy performance rating methods.

R406.1.1 Approved alternative energy performance methods. The following rating threshold criteria are sufficient to demonstrate energy code compliance under section R406 without calculation of a standard reference design. The mandatory provisions listed in R406.2 also apply:

1. **ENERGY STAR Homes 3.1 certified.** New buildings or additions to an existing building, building system or portion thereof shall be certified to conform to the ENERGY STAR Certified Homes, Version 3.1 standard.
2. **Passive House Institute US (PHIUS) or Passive House Institute (PHI) certified.** Projects certified as meeting the PHIUS+ 2015 or 2018 Passive Building Standard – North America, or newer, demonstrated using approved software by PHIUS, where PHIUS certification is demonstrated by a Certified Passive House Consultant; or, Project certified as meeting Certified Passive House standard using software by PHI, where PHI certification is demonstrated by a Certified Passive House Designer.
3. Any other software approved by the Board of Building Regulations and Standards.

R406.3 Revise as follows:

R406.3 Energy Rating Index. The Energy Rating Index (ERI) shall be determined in accordance with RESNET/ICC 301 except for buildings covered by the *International Residential Code*, the ERI Reference Design Ventilation rate shall be in accordance with Equation 4-1.

$$\text{Ventilation rate, CFM} = (0.01 \times \text{total square foot area of house}) + [7.5 \times (\text{number of bedrooms} + 1)]$$

(Equation 4-1)

Energy used to recharge or refuel a vehicle used for transportation on roads that are not on the building site shall not be included in the ERI *reference design* or the *rated design*.

R406.4 Revise the section as follows:

R406.4 ERI-based compliance. Compliance based on an ERI analysis requires that the *rated design* be shown to have an ERI less than or equal to the appropriate value listed in Table R406.4 when compared to the ERI *reference design* for each dwelling unit prior to credit for onsite renewable electric generation.

**TABLE R406.4
MAXIMUM ENERGY RATING INDEX**

On-site Renewable Energy Application	Maximum HERS Index score^{a, b}	
	New construction	Whole house renovations; additions
None	55	65
Solar Electric Generation	60	70
Clean Space Heating	60	70
DHW	57	67

Solar Electric & Clean Space Heating	65	75
Solar Electric & DWH	62	72
Solar Electric & Clean Space Heating & DHW	67	77

^a Maximum HERS rating prior to onsite renewable electric generation in accordance with Section R406.4

^b 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 Table R402.1.4 of the 2015 International Energy Conservation Code.

R406.4.1 Add the subsection, as follows:

R406.4.1 Trade-off for onsite renewable energy systems. New construction following R406.3 or existing buildings and additions following R407IECC chapter 5[RE] may use any combination of the following renewable energy trade-offs to increase the maximum allowable HERS rating for each unit separately served by any combination of the following:

1. **Renewable Solar Electric Generation:** Solar photovoltaic array rated at 2.5kW or higher shall offset 5 HERS points.
2. **Renewable Clean Space Heating:** Clean Biomass Heating System, solar thermal array, cold climate air source heat pump having rated coefficient of performance (COP) of at least 1.75 at 5 degrees Fahrenheit, or geothermal heat pump, or a combination of these systems, operating as the primary heating system shall offset 5 HERS points.
3. **Renewable Domestic Hot Water Heating (DHW):** Solar thermal array heating shall offset 2 HERS points.

R406.5 Revise section as follows:

R406.5 Verification by approved agency. Verification of compliance with Section R406 shall be completed by an *approved* third party. For compliance using a HERS Index rating or Energy Star Homes 3.1 certification, verification of compliance shall be completed by the certified HERS rater. For compliance using PHIUS+ 2015, PHIUS+2018 or PHI software, verification of compliance shall be completed by a certified Passive House consultant.

R406.6 Revise this section as follows:

R406.6 Documentation. Documentation of the software used to determine the ERI and the parameters for the residential building shall be in accordance with Sections R406.6.1 through R406.6.34.

R406.6.1 Compliance software tools. If using the ERI or Energy Star Homes compliance path, software tools used for determining ERI shall be Approved Software Rating Tools in accordance with RESNET/ICC 301. Where calculations require input values not specified by Sections R402, R403, R404 and R405, those input values shall be

taken from RESNET/ ICC 301. **If using the Passive House compliance path, software tools for determining Passive House certification shall be approved software tools by PHIUS or PHI.**

R406.6.2 ERI Documentation. Prior to the issuance of a building permit, the following items must be provided to the Building Official:

1. A HERS compliance report which includes a proposed HERS index score of 55 or lower, or otherwise complies via renewable trade-offs;
2. A description of the unit's energy features; and
3. A statement that the rating index score is "based on plans"

Prior to the issuance of a certificate of occupancy, the following items must be provided to the Building official:

4. A copy of the final certificate indicating that the HERS rating index score for each unit is verified to be 55 or less or otherwise complies via renewable trade-offs, together with a completed HERS rater verified ENERGY STAR Thermal Enclosure Checklist.
5. **A copy of the certificate, as required by Section R401.3 for each unit listing the final HERS index score of the dwelling unit.**

R406.6.3 ~~If using~~ ENERGY STAR Homes, Version 3.1 Documentation. Prior to the issuance of a building permit, the following item(s) must be provided to the Building Official:

1. A copy of the preliminary HERS rating, based on plans
2. A description of the unit's energy features; and
3. A statement that the rating index score is "based on plans"

Prior to the issuance of a certificate of occupancy, the following items must be provided to the Building Official:

4. A copy of the final ENERGY STAR Homes certificate;
5. A copy of the certified final HERS rating; and
6. A copy of the signed ENERGY STAR Thermal Enclosure System Checklist.
7. **A copy of the certificate, as required by Section R401.3 for each unit listing the final HERS index score of the dwelling unit.**

R406.6.4 Passive House Documentation. If using PHIUS or PHI Passive House software, prior to the issuance of a building permit, the following item(s) must be provided to the Building Official:

1. A list of compliance features
2. A statement that the estimated Specific Space Heat Demand and other Passive House certification requirements are "based on plans"

Prior to the issuance of a certificate of occupancy, the following item must be provided to the building official:

3. **A copy of the final report, submitted on a form that is approved to document compliance with current PHIUS or PHI standards. Said report must indicate that the finished building achieves a Certified Passive House Consultant-verified Standard.**

Add new section R407 as follows:

R407 Additional Efficiency Packages

R407.1 Requirements (Prescriptive)

Projects shall comply with at least one of the following:

1. More efficient HVAC performance in accordance with Section R407.2
2. Heat recovery ventilation (HRV) system in accordance with Section R403.6.1. The Exception in R403.6.1 shall not be applied if used for compliance with this Section.
3. High efficiency water heater or solar thermal hot water heater in accordance with Section R407.3

R407.2 More efficient HVAC performance. Primary heating equipment shall meet one of the following efficiency requirements:

1. Gas, propane or oil-fired furnaces with a minimum AFUE of 95%
2. Gas, propane or oil-fired boilers with a minimum AFUE of 95%
3. Closed-loop ground source heat pump with a minimum COP of 3.5
4. Air-source heat pump with a minimum HSPF of 10

R407.3 High efficiency water heating or solar thermal hot water heater. Hot water heating systems shall meet one of the following:

1. Natural gas or propane water heating with a minimum Uniform Energy Factor (UEF) of 0.87 or electric heat pump hot water heater with a minimum UEF of 2.2. On-demand natural gas or propane water heaters shall not include any buffer tank or hot water storage capacity outside the water heater itself.
2. A solar thermal hot water heating system with a minimum of 40 square feet of gross collection area. The solar hot water heating panels shall have a total solar resource fraction that is not less than 75%.

CHAPTER 5 [RE] EXISTING BUILDINGS

R502 ADDITIONS.

Add a section as follows:

R502.1.1.5 Electric Vehicle Charging Spaces (“EV Ready Spaces”). The number of EV Ready Spaces for the *addition* shall comply with Section R404.2.

Exception:

Where the existing electric service capacity is not being upgraded and capacity is not available.

R502.1.2 Revise the subsection as follows:

R502.1.2 Existing plus addition compliance (Simulated Performance Alternative). Where no *unconditioned space* is changed to *conditioned space*, the *addition* shall comply where the annual energy cost or energy use of the *addition* and the existing *building*, and any *alterations* that are part of the project, is less than or equal to the annual energy cost of the existing *building* when modeled in accordance with Section R405. The *addition* and any *alterations* that are part of the project shall comply with Section R405 in its entirety. **R406 and shall achieve a maximum HERS index using Table R406.4.1.**

R503.2 Delete the exception:

R503.2 Change in space conditioning.

Any nonconditioned or low-energy space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

Exception: Where the simulated performance option in Section R405 is used to comply with this section, the annual energy cost of the proposed design is permitted to be 110 percent of the annual energy cost otherwise allowed by Section R405.3.

Appendix RA: Solar-ready Provisions – Detached One- and Two-family Dwellings and Townhouses

(Adopted as amended)

SECTION RA101 SCOPE

RA101.1 General. These provisions shall be applicable for new construction, **except additions.**

SECTION RA102

GENERAL DEFINITION

SOLAR-READY ZONE. A section or sections of the roof or building overhang designated and reserved for the future installation of a solar photovoltaic or solar thermal system.

SECTION RA103

SOLAR-READY ZONE

RA103.1 General. New detached one- and two-family dwellings, and townhouses with not less than 600 square feet (55.74 m²) of roof area oriented between 110 degrees and 270 degrees of true north shall comply with Sections RA103.2 through RA103.8.

Exceptions:

1. New residential buildings with a permanently installed on-site renewable energy system.

2. A building with a solar-ready zone that is shaded for more than 70 percent of daylight hours annually.
3. Buildings and structures as designed and shown in construction documents that do not meet the conditions for a solar-ready zone area.

RA103.2 (RB103.2) Construction document requirements for solar ready zone. Construction documents shall indicate the solar ready zone [where applicable](#).

RA103.3 (RB103.3) Solar-ready zone area. The total solar-ready zone area shall be consist of an area not less than 300 square feet (27.87 m²) exclusive of mandatory access or set back areas as required by the [MA Fire Code](#). New townhouses three stories or less in height above grade plane and with a total floor area less than or equal to 2,000 square feet (185.8 m²) per dwelling shall have a solar-ready zone area of not less than 150 square feet (13.94 m²). The solar-ready zone shall be composed of areas not less than 5 feet (1524 mm) in width and not less than 80 square feet (7.44 m²) exclusive of access or set back areas as required by the [MA Fire Code](#).

RA103.4 Obstructions. Solar-ready zones shall [be consist of an area](#) free from obstructions, including but not limited to vents, chimneys, and roof-mounted equipment.

NOTE: [Nothing in RA103.4 shall require any construction documents to be redesigned or reconfigured so as to create a solar-ready zone area.](#)

RA103.5 Roof load documentation. The structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents.

RA103.6 Interconnection pathway. Construction documents shall indicate pathways for routing of conduit or plumbing from the solar-ready zone to the electrical service panel or service hot water system.

~~**RA103.7 Electrical service reserved space.** The main electrical service panel shall have a reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and shall be labeled "For Future Solar Electric." The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.~~

RA103.87 Construction documentation certificate. A permanent certificate, indicating the solar-ready zone and other requirements of this section, shall be posted near the electrical distribution panel, water heater or other conspicuous location by the builder or registered design professional.

Add new Referenced Standard to Chapter 6 [RE] as follows:

1/23/2019

Washington, DC 20585

10 CFR Part 430, Subpart B, Appendix E: Uniform Test Method for Measuring the Energy Consumption of Water Heaters

R407.3
