780 CMR: MASSACHUSETTS AMENDMENTS TO THE *INTERNATIONAL BUILDING CODE 2015*

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780 CMR: MASSACHUSETTS AMENDMENTS TO THE *INTERNATIONAL BUILDING CODE 2015*

CHAPTER 13: COMMERCIAL ENERGY EFFICIENCY

1300.1 Add the following sections as follows:

1301.1.1 Revise subsection as follows:

[E] 1301.1.1 Criteria. Buildings shall be designed and constructed in accordance with the International Energy Conservation Code-2018 ("IECC") as modified by 780 CMR 13.00. These amendments are intended to expressly apply to the IECC, and are also applicable, in intent, to ANSI/ASHRAE/IESNA 90.1.

Exception 1: Temporary structures, as regulated by section 3103, do not need to comply with the building envelope requirements of 780 CMR 13.00.

Exception 2: Applications for building permits and related construction and other documents filed through August 7, 2020 may comply either with 780 CMR 13.00 and 780 CMR 115.00: *Appendix AA*, effective February 7, 2020, or with the versions of those provisions in effect immediately prior to February 7, 2020, but not a mix of both. After August 7, 2020, concurrency with the prior version of 780 CMR ends, and all applications for building permits and related construction and other documents shall comply with 780 CMR effective February 7, 2020 only.

Informational Note: Amendments to the IECC contained within 780 CMR 1300.1 are identified by the letter "C" followed by the applicable section number.

C103.2 Insert after Subsection C13.2(12) the following:

13. Solar Ready roof zone in accordance with Appendix CA
14. EV Ready Space locations in accordance with C405.10

C202 Revise Section by inserting 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 12.00: Massachusetts Electrical Code (Amendments) 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 12.00: Massachusetts Electrical Code (Amendments) 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.

C301.1 Replace the section with the following:

Massachusetts is a Climate Zone 5A

C301.1 Delete Table

C401.2 Revise section as follows:

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 C402.3, C405.3, C405.4, C405.9, and C406.

13.00: continued

a. If following Appendix G, then use ANSI/ASHRAE/IESNA 90.1 - 2016 as modified by Massachusetts amended sections: 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 Massachusetts amended sections: C401.2, C402.1.5, C402.3, C405.3, C405.4, C405.9, and C406.

2. IECC Prescriptive Path. The requirements of sections C402 through C405. In addition, commercial buildings shall comply with section C406 and tenant spaces shall comply with section C406.1.1.

3. Certified Performance Path The requirements of sections C407, C402.3, C405, and C408.

C401.2.3 Amend the subsection as follows:

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) meter	2.80
Electricity (On-site Solar or Wind)	1.00
Natural Gas	1.05
Fuel Oil	1.01
LPG	1.01
Purchased District Heating Hot Water Steam	 1.20 1.20
Purchased District Cooling	0.91
Fossil fuels not listed	1.1
Purchased Combined Heat and Power District Heat	0

* A source fuel conversion for purchased district heat supplied by a combined heat and power central utility will be published by the Massachusetts Department 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 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.

13.00: continued

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.

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%**

C402.1.5 Insert the following at the end of the subsection:

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.

C402.3 Replace the subsection as follows:

C402.3 Rooftop Solar Readiness (Mandatory). Follow Appendix CA: Solar-ready Zone - Commercial.

C402.5.1.2 Delete Item 16 ["Solid or hollow masonry constructed of clay or shale masonry units."]

C402.5.1.2.2 Replace with the following:

C402.5.1.2.2 Assemblies. Assemblies of materials and components with an average air leakage not greater than 0.04 cfm/ft^2 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 2 shall be deemed to comply, provided joints are sealed and the requirements of section C402.5.1.1 are met.

1. Concrete masonry walls coated with either one application of block filler or two applications of a paint or sealer coating.
2. A Portland cement/sand parge, stucco or plaster not less than ½-inch (12.7 mm) in thickness.

C402.6 Add section as follows:

C402.6 Approved Calculation Software Tools. The following software tools are sufficient to demonstrate compliance with section C401.2 prescriptive path options 1 or 2:

COMcheck: COMcheck-Web or COMcheck for Windows Version 4.1.1, or later, which can be accessed at: https://www.energycodes.gov/. Software tools approved to demonstrate compliance with Section 401.2 option 3 Performance Certification methods are listed in Section C407.4.

C405.2.2.1 Replace the first paragraph with the following:

C405.2.2.1 Time-switch control function. Each space provided with time-switch controls shall be provided with a light reduction control in accordance with Section C405.2.2.2. Time-switch controls shall comply with the following:

13.00: continued

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 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.

C405.2.3.1 Replace the exception with the following:

Up to 100 watts of lighting in each space is permitted to be controlled together with lighting in a daylight zone facing a different cardinal orientation.

C405.3.2 Replace Table C405.3.2(1) with the following (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	0.75
Convention Center	0.64
Courthouse	0.79
Dining: Bar Lounge/Leisure	0.80
Dining: Cafeteria/Fast Food	0.76
Dining: Family	0.71
Dormitory	0.53
Exercise Center	0.72
Fire Station	0.56
Gymnasium	0.76
Health Care Clinic	0.81
Hospital	0.96
Hotel/Motel	0.56
Library	0.83
Manufacturing Facility	0.82
Motion Picture Theater	0.44
Multifamily	0.45
Museum	0.55

13.00: continued

Building Area Type	LPD (w/ft^2)
Office	0.64
Parking Garage	0.18
Penitentiary	0.69
Performing Arts Theater	0.84
Police Station	0.66
Post Office	0.65
Religious Building	0.67
Retail	0.84
School/University	0.72
Sports Arena	0.76
Town Hall	0.69
Transportation	0.50
Warehouse	0.45
Workshop	0.91

C405.3.2(2) Replace Table C405.3.2(2) with the following (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	0.39
Greater than 40 feet in Height	0.60
Audience Seating Area	
In an Auditorium	0.61
In a Gymnasium	0.23
In a Motion Picture Theater	0.27
In a Penitentiary	0.67
In a Performing Arts Theater	1.16
In a Religious Building	0.72
In a Sports Arena	0.33
Otherwise	0.23
Banking Activity Area	0.61
Breakroom (*see* Lounge/Breakroom)	

13.00: continued

Common Space Types	LPD (watts/ sq.ft)
Classroom/Lecture Hall/Training Room	
In a Penitentiary	0.89
Otherwise	0.71
Computer Room	0.94
Conference/Meeting/Multipurpose Room	0.97
Copy/Print Room	0.31
Corridor	
In a Facility for the Visually Impaired (and Not Used Primarily by the Staff)	0.71
In a Hospital	0.71
Otherwise	0.41
Courtroom	1.20
Dining Area	
In Bar/Lounge or Leisure Dining	0.86
In Cafeteria or Fast Food Dining	0.40
In a Facility for the Visually Impaired (and Not Used Primarily by the Staff)	1.27
In Family Dining	0.60
In a Penitentiary	0.42
Otherwise	0.43
Electrical/Mechanical Room	0.43
Emergency Vehicle Garage	0.52
Food Preparation Area	1.09
Guestroom	0.41
Laboratory	
In or as a Classroom	1.11
Otherwise	1.33
Laundry/Washing Area	0.53
Loading Dock, Interior	0.88
Lobby	
For an Elevator	1.69
In a Facility for the Visually Impaired (and Not Used Primarily by the Staff)	0.51
In a Hotel	
In a Motion Picture Theater	0.23
In a Performing Arts Theater	1.25

13.00: continued

Common Space Types	LPD (watts/ sq.ft)
Otherwise	0.84
Locker Room	0.52
Lounge/Breakroom	
In a Healthcare Facility	0.42
Otherwise	0.59
Office	
Enclosed ≤250sf	0.74
Enclosed ≥250sf	0.66
Open Plan	0.61
Parking Area, Interior	0.15
Pharmacy Area	1.66
Restroom	
In a Facility for the Visually Impaired (and Not Used Primarily by the Staff)	1.26
Otherwise	0.63
Sales Area	1.05
Seating Area, General	0.23
Stairway (*see* Space Containing Stairway)	
Stairwell	0.49
Storage Room	0.51
Vehicular Maintenance Area	0.60
Workshop	1.26
Building Type Specific Space Types	
Automotive (*see* Vehicular Maintenance Area)	
Convention Center-exhibit Space	0.61
Dormitory-living Quarters	0.50
Facility for the Visually Impaired	
In a Chapel (and Not Used Primarily by the Staff)	0.70
In a Recreation Room (and Not Used Primarily by the Staff)	1.77
Fire Station-sleeping Quarters	0.23
Gymnasium/Fitness Center	
In an Exercise Area	0.90
In a Playing Area	0.85

13.00: continued

Common Space Types	LPD (watts/ sq.ft)
Healthcare Facility	
In an Exam/Treatment Room	1.40
In an Imaging Room	0.94
In a Medical Supply Room	0.62
In a Nursery	0.92
In a Nurse's Station	1.17
In an Operating Room	2.26
In a Patient Room	0.68
In a Physical Therapy Room	0.91
In a Recovery Room	1.25
Library	
In a Reading Area	0.96
In the Stacks	1.18
Manufacturing Facility	
In a Detailed Manufacturing Area	0.80
In an Equipment Room	0.76
In an Extra-high-bay Area (Greater than 50' Floor-to-ceiling Height)	1.42
In a High-bay Area (25-50' Floor-to-ceiling Height)	1.24
In a Low-bay Area (Less than 25' Floor-to-ceiling Height)	0.86
Museum	
In a General Exhibition Area	0.31
In a Restoration Room	1.10
Performing Arts Theater-dressing room	0.41
Post Office-sorting Area	0.76
Religious Buildings	
In a Fellowship Hall	0.54
In a Worship/Pulpit/Choir Area	0.85
Retail Facilities	
In a Dressing/Fitting Room	0.51
In a Mall Concourse	0.82
Sports Arena-playing Area	
For a Class I Facility	2.94
For a Class II Facility	2.01

13.00: continued

Common Space Types	LPD (watts/ sq.ft)
For a Class III Facility	1.30
For a Class IV Facility	0.86
Transportation Facility	
In a Baggage/Carousel Area	0.39
In an Airport Concourse	0.25
At a Terminal Ticket Counter	0.51
Warehouse-storage Area	
For Medium to Bulky, Palletized Items	0.33
For Smaller, Hand-carried Items	0.69

C405.10 Add a section as follows:

C405.10 Electric Vehicle Charging Spaces ("EV Ready Spaces"). Group A-1, B, E, I, M and R buildings with 15 or more passenger vehicle parking spaces shall provide one EV Ready Space.

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 Revise section as follows:

C406.1 Requirements. Buildings following either ASHRAE 90.1 or IECC shall comply with at least 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 406.9.
9. Renewable space heating in accordance with Section 406.10.
10. Type IV Heavy timber construction in accordance with Section 406.11.

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% 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% of the total lighting power allowance calculated in accordance with Section C405.4.2.

13.00: continued

C406.4 Revise section as follows:

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. 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 Revise section as follows:

C406.5 On-site Renewable Energy. The total minimum ratings of on-site renewable energy systems shall be one of the following:

1. Not less than 1.71 Btu/h per square foot (5.4 W/m^2)0.50 watts per square foot (5.4 W/m^2) of conditioned floor area.
2. Not less than 3% of the design 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% 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, § 11F½ (Massachusetts alternative energy portfolio standard).
4. Provide not less than 65% 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 four.

C406.7.1 Revise section as follows:

C406.7.1 Load Faction. The building service water-heating system shall have one or more of the following that are sized to provide not less than 60% of the building's annual hot water requirements, or sized to provide 100% 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 Add Section as follows:

C406.10 Renewable Space Heating. All space heating shall be provided with cold-climate air source heat pump having rated coefficient of performance (COP) of at least 1.75 at 5°F source air.

C406.11 Add section as follows:

C406.11 Heavy Timber Construction. In buildings with four stories or more of Type IV heavy timber construction either above grade, or above a podium.

13.00: continued

C407 Replace this Section with the following:

C407 Building Performance Certification Methods.

C407.1 Scope. The following sections C407.1.1 or C407.1.2 are approved performance certification methods 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) for Multi-familyBbuildings. For residential units within a building up to five stories above grade plane, a HERS rater verified Energy Rating Index (ERI) score of 55 or less for each finished unit together with a completed and HERS rater verified ENERGY STAR Thermal Enclosure System Rater Checklist may be used.

C407.1.2 Passive House Institute US ("PHIUS") or Passive House Institute ("PHI") Approved Software. Projects precertified through PHIUS or PHI with a Certified Passive House Consultant or certified Passive House Designer verified "as-built" report demonstrating compliance with the PHIUS or PHI standard.

C407.2 Mandatory Requirements. Compliance with this section requires compliance with Sections C402.3 and C405.

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 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.

C407.5 Documentation. Documentation verifying that the methods and accuracy of compliance software tools conform to the provisions of this section shall be provided to the building official, in accordance with Sections C407.5.1 through C407.5.2

C407.5.1 ERI Documentation.

1. Prior to the issuance if a building permit, the following items must be provided to the Building Official:
   a. A HERS compliance report which includes a proposed HERS index score of 55 or lower
   b. A description of the unit's energy features
   c. A statement that the rating index score is "based on plans"
2. Prior to the issuance of a certificate of occupancy, the following items must be provided to the Building official:
   a. A copy of the final certificate indicating that the HERS rating index score for each unit is verified to be 55 or less
   b. A completed HERS rater verified ENERGY STAR Thermal Enclosure System Rater Checklist.

C407.5.2 Passive House Documentation. If using PHIUS or PHI Passive House software:

1. Prior to the issuance of a building permit, the following items must be provided to the Building Official:
   a. A WUFI or PHPP compliance report which demonstrates project compliance with PHIUS+2018 (or newer) or PHI performance requirements;
   b. A statement that the WUFI or PHPP results are "based on plans";
   c. Evidence of precertification approval from PHIUS or PHI.A list of compliance features.

13.00: continued

2. Prior to the issuance of a certificate of occupancy, the following item(s) must be provided to the building official:

a. An updated WUFI or PHPP compliance report which demonstrates project compliance with PHIUS+2018 (or newer) or PHI performance requirements;

b. A copy of the Passive House Rater's test results;

c. A statement that the WUFI or PHPP results are "based on 'as-built' conditions, incorporating the relevant test results and documented changes to equipment, materials, and assemblies that impact performance".

C407.6 Verification by Approved Agency. Verification of compliance with Section C407 shall be completed by an approved third party. For compliance using an ERI certification, verification of compliance shall be completed by the certified HERS rater. For compliance using PHIUS or PHI, verification of compliance shall be completed by a certified Passive House consultant.

C502.2 Add a subsection as follows:

C502.2.7 Electric Vehicle Charging Spaces ("EV Ready Spaces"). Reserved.

115.00: continued

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 2018 section R406 of 780 CMR 51.00: *Massachusetts Residential Code*.

AA103.2 Large Area and High Energy Use Buildings. All buildings over 100,000 ft^2, and new supermarkets, laboratories and conditioned warehouses over 40,000 ft^2 shall comply with 780 CMR 13.00: *Energy Efficiency* and shall demonstrate energy use per square foot at least 10% below the energy requirements of ANSI/ASHRAE/IESNA 90.1 APPENDIX G-2013 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 AA103.1 dwelling unit requirements.

AA103.3 Other New Buildings. New buildings not covered in AA103.1 and AA103.2 shall comply with 780 CMR 13.00: *Energy Efficiency* or Chapter 11 of 780 CMR 51.00: *Massachusetts Residential Code* 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 13.00: *Energy Efficiency* or Chapter 11 of 780 CMR 51.00: *Massachusetts Residential Code* shall be used as applicable based on the use and occupancy of the building.

NON-TEXT PAGE

51.00: continued

R905.16 Reserved

R906.1 Revise the section as follows:

R906.1 General. The use of above-deck thermal insulation shall be permitted provided such insulation is covered with an approved roof covering and complies with FM 4450 or UL 1256. In roofing and reroofing, the energy conservation requirements of Chapter 11 of 780 CMR 51.00 shall also be satisfied.

R907.1 through R907.5 Reserved

R909.1 through R909.3 Reserved

Chapter 10: CHIMNEYS AND FIREPLACES

R1001.1 Revise the section as follows:

R1001.1 General. Masonry fireplaces shall be constructed in accordance with this section and the applicable provisions of Chapters 3 and 4 of 780 CMR 51.00. Chimneys shall be structurally sound, durable, smoke tight and capable of conveying flue gases to the exterior safely.

Chapter 11: ENERGY EFFICIENCY

N1100.1 Add the following sections as follows:

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

Exception: Applications for building permits and related construction and other documents filed through August 7, 2020 may comply either with 780 CMR 51.00: *Chapter 11*, effective February 7, 2020, or with the versions of those provisions in effect immediately prior to February 7, 2020, but not a mix of both. After August 8, 2020, concurrency with the prior version of 780 CMR ends, and all applications for building permits and related construction and other documents shall comply with 780 CMR effective February 7, 2020 only.

Informational Note: Amendments to the IECC contained within 780 CMR 51.00 are identified by the letter "R" followed by the applicable section number.

R401.1 Revise the section as follows:

R401.1 Scope. This chapter regulates the energy efficiency for the design and construction of buildings regulated by 780 CMR. Municipalities which have adopted the Stretch Energy Code shall use the energy efficiency requirements of 780 CMR 110 *Appendix AA*.

Exception: Temporary structures, as regulated by Section 3103, do not need to comply with the building envelope requirements of 780 CMR 51.00.

R103.2 Add the following to this subsection:

#9. EV Ready Space locations per R404.2.
10. Solar-ready Zone in accordance with Appendix RA

R202 Add and/or revise the following defined terms:

Clean Biomass Heating Systems. Wood-pellet fired central boilers and furnaces where the equipment has a thermal efficiency rating of 80% (higher heating value) or greater; and a particulate matter emissions rating of no more than 0.15 lb/MMBtu PM heat output.

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 12.00: *Massachusetts Electrical Code (Amendments)* section 625.2.

51.00: continued

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 12.00: *Massachusetts Electrical Code (Amendments)* 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.

High Efficiency Lamps. Light-emitting diode (LED) lamps with an efficiency 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. 45 lumens per watt for lamps 15 watts or less.

R301 Replace the section with the following:

Massachusetts is a Climate Zone 5A

Delete Table R301.1

R401.1 Replace the section 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 115.00 *Appendix AA* and 780 CMR 51.00 as applicable.

R401.2 Revise the section as follows:

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

1. Prescriptive Path. Sections R401 through R404 and R407.
2. Performance Path. An 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 Massachusetts amendments.
   b. Certified Energy Star Homes, Version 3.1.
   c. Certified Passive house performance method.

R401.3 Add the following to the end of the paragraph:

The Certificate shall list the final HERS index score when applicable.

R402.1.5.1 Add the subsection as follows:

R402.1.5.1 Approved Software for Prescriptive Path 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 by inserting the following sentence at the beginning of the column entitled "INSULATION INSTALLATION CRITERIA" in the row entitled "General requirements":

All insulation shall be installed at Grade I quality in accordance with ICC/RESNET 301.

R403.3.3 Replace the last paragraph with the following:

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*.

51.00: continued

R403.6 Replace the section with the following:

R403.6 Mechanical Ventilation (Mandatory). 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 Equation 4-1:
   Ventilation rate, CFM = (0.01 x total square foot area of house) + [7.5 x (number of bedrooms + 1);
2. Energy Star Homes Version, 3.1.;
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 ft^2
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	0.6
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 following subsections:

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 Air Movement and Control Association ("AMCA") or Home Ventilating Institute ("HVI") 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 one sone.

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

51.00: continued

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 ten feet 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 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 feet above grade directly in line with the vent terminal. The sign shall read, in print no less than ½ inch in size, “MECH. VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS”.

Exceptions:

1. Ventilation air inlets in the wall shall be separated from dryer exhausts and contamination sources exiting through the roof by a minimum of three feet.
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 subsection as follows:

R404.2 Electric Vehicle Charging Spaces ("EV Ready Spaces") Reserved. EV Ready spaces are not required for detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories above grade plane in height and their accessory structures not more than three stories above grade place. All other occupancies otherwise directed to follow the provisions of 780 CMR 51.00: *Massachusetts Residential Code* must adhere to any EV requirements found in 780 CMR 1300.1(C405.10).

R405 Delete subsection and insert the following:

R405 Reserved

R406.1 Revise this 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 R406 without calculation of a standard reference design. The mandatory provisions of subsection R406.2 also apply:

1. **ENERGY STAR Homes 3.1 Path**. 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") Approved Software**. Projects pre-certified through PHIUS or PHI, with a certified Passive House Consultant or certified Passive House Designer verified "as-built" report demonstrating compliance with the PHIUS or PHI standard.
3. Any other software approved by the Board of Building Regulations and Standards.

R406.3 Revise Subsection as follows:

R406.3 Energy Rating Index. 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.

51.00: continued

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 dwellings unit prior to credit for onsite renewable electric generation.

Table R406.4.
Maximum Energy Rating Index

	Maximum HERS Index Score[a], [b]	
On-site Renewable Energy Application	**New Construction**	**Whole House Renovations; Additions**
None	55	65
Solar Electric Generation	60	70
Clean Space Heating	60	70
DHW	57	67
Solar Electric and Clean Space Heating	65	75
Solar Electric and DWH	62	72
Solar Electric, Clean Space Heating and 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 SectionR406.2, 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

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 IECC chapter 5 [RE] may use renewable energy trade-offs to increase the maximum allowable HERS rating for each unit separately served by any combination of the following:

1. Solar Generation. Solar photovoltaic array rated at 2.5kW or higher shall offset five HERS points.
2. 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°F, or geothermal heat pump, or a combination of these systems, operating as the primary heating system shall offset five HERS points.
3. Renewable Domestic Hot Water Heating (DHW). Solar thermal array or heat pump for primary domestic hot water heating shall offset two HERS points.

R406.5 Revise the 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 rating or Energy Star Homes 3.1 certification, verification of compliance shall be completed by the certified HERS rater. For compliance using PHIUS or PHI, 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 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.

51.00: continued

R406.6.2 ERI Documentation. Prior to the issuance if 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 System Rater 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 ENERGY STAR Homes, Version 3.1 Documentation. Prior to the issuance of a building permit, the following items(s) must be provided to the Building Official:

a. A copy of the preliminary HERS rating, based on plans
b. A description of the unit's energy features; and
c. 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:

d. A copy of the final ENERGY STAR Homes certificate;
e. A copy of the certified final HERS rating; and
f. A copy of the signed ENERGY STAR Thermal Enclosure System Rater Checklist.
g. 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.

1. 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:
   a. A WUFI or PHPP compliance report which demonstrates project compliance with PHIUS+2018 (or newer) or PHI performance requirements;
   b. A statement that the WUFI or PHPP results are "based on plans";
   c. Evidence of precertification approval from PHIUS or PHI.
2. Prior to the issuance of a certificate of occupancy, the following item(s) must be provided to the building official:
   a. An updated WUFI or PHPP compliance report which demonstrates project compliance with PHIUS+2018 (or newer) or PHI performance requirements;
   b. A copy of the Passive House Rater's test results;
   c. A statement that the WUFI or PHPP results are "based on 'as-built' conditions, incorporating the relevant test results and documented changes to equipment, materials, and assemblies that impact performance".

R407 Add new section 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 or Energy recovery ventilation (ERV) 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

51.00: continued

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 pumps with a minimum COP of 3.5
4. Air-source heat pumps 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%.

R502.1.2 Replace the subsection with the following:

R502.1.2 Existing plus Addition Compliance (Simulated Performance Alternative). The addition and any alterations that are part of the project shall comply with Section R406 and shall achieve a maximum HERS index using Table R406.4.

R503.2 Amend the subsection by deleting the Exception.

Add a new Referenced Standard to Chapter 6 of the IECC as follows:

DOE U.S. Department of Energy
1000 Independence Ave SW
Washington DC 20585

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

Chapter 12: MECHANICAL ADMINISTRATION

M1201.1 Revise the section as follows:

M1201.1 Scope. The provisions of Chapters 12 through 23 of 780 CMR 51.00 shall regulate the design, installation, maintenance, alteration and inspection of mechanical systems that are permanently installed and used to control environmental conditions within buildings. These chapters shall also regulate those mechanical systems, system components, equipment and appliances specifically addressed in this code.

For the provisions of Chapters 12 through 23 of 780 CMR 51.00 governed by the specialized codes (*see* 780 CMR 1.00: *Scope and Administration* (*Unique to Massachusetts*)), *see* the applicable specialized codes. Provisions related to work otherwise governed by 780 CMR 51.00 shall be retained if not in conflict with other sections of 780 CMR 51.00. Enforcement of work governed by the specialized codes shall be by those persons so authorized.

Additional requirements for boilers and other pressure vessels may be found in M.G.L. c. 146 and 522 CMR: *Board of Boiler Rules*, as applicable.

Chapter 13: GENERAL MECHANICAL SYSTEM REQUIREMENTS

M1303.2 Add the section as follows:

M1303.2 Solid Fuel-burning Central Heating Appliance Labeling. Solid fuel-burning boilers or warm air furnaces shall bear a permanent and legible factory-applied label supplied to the manufacturer and controlled by an approved testing agency; such label shall contain applicable items in section M1303.1 and the following information:

a. Type of appliance (boiler or warm air furnace); and

b. Boilers, pressure vessels, and pressure relief devices shall be stamped in accordance with M.G.L. c. 146, §§ 24 and 34.

51.00: continued

Chapter 14: HEATING AND COOLING EQUIPMENT

M1401.6 Add section and associated subsections as follows:

M1401.6 Used Solid Fuel-burning Appliances. Used solid fuel-burning appliances that predate the listing requirements set forth in 780 CMR 51.00 may be utilized but the installation of such appliances shall otherwise conform to the requirements of 780 CMR 51.00. as applicable, and such installations shall be inspected by the building official (or fire official in such towns that utilize the fire official for such inspection purposes).

M1401.6.1 Clearances to Combustibles. In the absence of listed clearances and floor protection requirements, used solid fuel-burning appliances shall be installed in accordance with the clearances of 780 CMR 51.00.

M1401.6.2 Floor Protection General. Floor protection listing requirements for a used appliance shall be met. In the absence of listing requirements, solid fuel-burning appliances shall have floor protection that is noncombustible material applied to the combustible or noncombustible floor area underneath and extending in front, to the sides and to the rear of a heat producing appliance, and have the necessary thermal conductivity to satisfy the floor protection requirements of the appliance. Various "hearth rugs," "mats," "tile board," "hearth board" and similar products sold as floor protectors may be noncombustible but may not satisfy thermal conductivity requirements of this section.

M1401.6.2.1 Floor Protection Requirements. Floor protection requirements shall be:

1. four inches (102 mm) of millboard having a thermal conductivity k = 0.84 (Btu) (inch)/(ft^2) (hour) (°F);
2. a noncombustible floor protector of the same overall thermal conductivity in (1.); or
3. approved by a registered design professional.

Exception: If existing floor protection can be demonstrated to have been adequate for a previous installation of a used solid fuel-burning appliance, then such floor protection shall be allowed. If calculations demonstrate that the existing floor protection has a thermal conductivity lower than that set by this section, then the existing floor protection may be maintained.

M1414.1 Revise the section as follows:

M1414.1 General. Fireplace stoves shall be listed, labeled and installed in accordance with the terms of the listing. Fireplace stoves shall be tested in accordance with UL 737. Also *see* Chapter 10 of 780 CMR 51.00 for detailed guidance on solid fuel-burning appliances.

Chapter 15: EXHAUST SYSTEMS (no amendments)

Chapter 16: DUCT SYSTEMS

M1601.3 Replace the section as follows:

M1601.3 Duct Insulation Materials. Duct insulation shall conform to the following requirements and the requirements of Chapter 11 of 780 CMR 51.00.

M1601.4 Replace the section as follows:

M1601.4 Installation. Duct installation shall comply with Subsections M1601.4.1 through M1601.4.7 and the requirements of Chapter 11 of 780 CMR 51.00.

51.00: continued

Appendix F: PASSIVE RADON GAS CONTROLS (Adopted as revised)

AF101.1 Revise the section as follows:

AF101.1 General. This appendix contains minimum requirements for new construction in the high radon potential counties as listed in Table AF101(1) regardless of the radon levels at the site. These requirements are intended to provide a passive means of resisting radon gas entry and prepare the dwelling for post-construction radon mitigation, if necessary. *See* Figure AF102. Active construction techniques, rather than passive techniques, shall be permitted to be used where approved.

Alternatively, the passive system requirements of ANSI/AARST Standard Designation #CCAH: *Reducing Radon in New Construction of One & Two Family Dwellings and Townhouses*, 2013 may be used for new construction in Zone 1, or approved equal system.

Irrespective of which approach is used, no testing is required as follows:

1. for the radon levels at the site prior to construction;
2. for the radon control system when completed; or
3. in the building after completion of the project.

Therefore, such testing shall not be a condition of issuing a certificate of occupancy.

AF102.1 Revise the definition of "GAS-PERMEABLE LAYER" as follows:

GAS-PERMEABLE LAYER. A gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate that is not less than four inches (102 mm) thick. The aggregate shall consist of material that will pass through a two inch (51 mm) sieve and be retained by a ¼-inch (6.4-mm) sieve.
2. A uniform layer of sand (native or fill) that is not less than four inches (102 mm) thick and that is overlain by a soil gas collection mat or soil gas matting installed in accordance with the manufacturer's instructions. The soil gas mat or matting shall be designed for this purpose and condition, and have the capacity to freely transport soil gases to the collection point from the most remote area.

AF103.2.2 Revise the subsection as follows:

AF103.2.2 Sumps. Sumps open to soil or serving as the termination point for subslab drain tile loops shall be covered with a gasketed or sealed lid. Sumps used as the suction point in a sub slab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet. Drainage systems that lead outside the foundation walls shall be isolated or trapped so as not to short-circuit the depressurization system.

AF103.3.1 Revise the subsection as follows:

AF103.3.1 Soil-gas-retarder. The soil in basements and enclosed crawl spaces shall be covered with a soil-gas-retarder. The soil-gas-retarder shall be lapped not less than 12 inches (305 mm) at joints and shall extend to foundation walls enclosing the basement or crawl space. The soil gas-retarder shall fit closely around any pipe, wire or other penetrations of the material. Punctures or tears in the material shall be sealed or covered with additional sheeting. The membrane shall extend upward six inches and shall be sealed to the perimeter footing or wall with an ASTM C290 class 25 or higher sealant or equal.

AF103.3.2 Revise the subsection as follows:

AF103.3.2 "T" Fitting and Vent Pipe. A "T" fitting shall be inserted beneath the soil-gas-retarder and be connected to a three-inch minimum vertical vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate not less than 12 inches (305 mm) above the roof in a location not less than ten feet (3,048 mm) away from any window or other opening into the conditioned spaces of the building that is less than two feet (610 mm) below the exhaust point. The horizontal legs of the "T" fitting shall connect to two five-foot long pieces of four-inch diameter perforated pipe laid horizontally in a 50 in^2 bed of gravel, filled with the same gravel as used in the gas-permeable layer.

51.00: continued

AF103.4.2 Revise the subsection as follows:

AF103.4.2 Soil-gas-retarder. A soil-gas-retarder shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly. The soil-gas retarder shall cover the entire floor area with separate sections lapped not less than 12 inches (305 mm) and shall extend upward six inches and be sealed to the wall with an ASTM C290 class 25 or higher sealant or equal. The soil-gas-retarder shall fit closely around any pipe, wire, or other penetrations of the material. Punctures or tears in the material shall be sealed or covered. Under-slab insulation, if used, shall be placed on top of the sheeting.

AF103.4.3 Revise the subsection as follows:

AF103.4.3 "T" Fitting and Vent Pipe. Before a slab is cast or other floor system is installed, a "T" fitting shall be inserted below the slab or other floor system and the soil-gas-retarder. The "T" fitting shall be connected to a three-inch minimum vertical vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate not less than 12 inches (305 mm) above the roof in a location not less than ten feet (3,048 mm) away from any window or other opening into the conditioned spaces of the building that is less than two feet (610 mm) below the exhaust point. The horizontal legs of the "T" fitting shall connect to two five-foot long pieces of four-inch diameter perforated pipe laid horizontally in a 50 in^2 bed of gravel, filled with the same gravel as used in the gas-permeable layer.

Appendix G: PIPING STANDARDS FOR VARIOUS APPLICATIONS (Reserved)

Appendix H: PATIO COVERS (Adopted in full)

Appendix I: PRIVATE SEWAGE DISPOSAL (Adopted as modified herein)

AI101.1 Revise the section as follows:

AI101.1 Scope. Private sewage disposal systems shall conform to the requirements of 310 CMR 15.000: *The State Environmental Code*, *Title 5: Standard Requirements for the Siting, Construction, Inspection, Upgrade and Expansion of On-site Sewage Treatment and Disposal Systems and for the Transport and Disposal of Septage*, and any additional legal restrictions imposed by the municipal health department.

Appendix J: EXISTING BUILDINGS AND STRUCTURES (Adopted as modified herein)

AJ101.1 Revise the section as follows:

AJ101.1 General. The purpose of *Appendix J* is to encourage the continued use or reuse of legally existing buildings and structures. The provisions of *Appendix J* are intended to permit work in existing buildings that is consistent with the purpose of 780 CMR 51.00. Compliance with these provisions shall be deemed to meet the requirements of 780 CMR 51.00.

Features of existing construction which do not meet the requirements of 780 CMR 51.00 for new construction shall be presumed to have met the regulations, codes or laws in effect at the time of construction or alteration and, if so, shall be deemed to be existing nonconforming. Unless stated otherwise, nothing in *Appendix J* shall require the upgrading or replacement of any existing nonconforming feature or component of an existing building, provided the feature, component or system is in serviceable condition. Components or features of an existing building which, in the opinion of the building official, are dangerous, unsafe, damaged, significantly deteriorated or which otherwise present a threat to occupants or to public safety shall be remediated in accordance with 780 CMR 51.00.

Any new building system or portion thereof shall conform to 780 CMR 51.00 for new construction to the fullest extent practicable. However, individual components of an existing building system may be repaired or replaced without requiring that system to comply fully with 780 CMR 51.00 unless specifically required by *Appendix J*.

For compliance of work governed by other codes, including the specialized codes, *see* section R101.4.

51.00: continued

AJ501.4 Revise the subsection as follows:

AJ501.4 Structural. The minimum design loads for the structure shall be the loads applicable at the time the building was constructed, provided that a dangerous condition is not created. Structural elements that are uncovered during the course of the alteration and that are found to be unsound or dangerous shall be made to comply with the applicable requirements of 780 CMR 51.00. Where alterations may decrease the structural performance of the existing building, such proposed activities shall be evaluated by a registered design professional for adequacy, prior to such actual structural alterations.

AJ501.5 Revise the subsection as follows:

AJ501.5 Electrical Equipment and Wiring. *See* 527 CMR 12.00: *Massachusetts Electrical Code (Amendments)*.

AJ601.5 Add a subsection as follows:

AJ601.5 Structural. Where reconstruction may decrease the structural performance of the existing building, such proposed activities shall be evaluated by a registered design professional for adequacy, prior to such actual structural reconstruction.

AJ701 Add a section as follows:

AJ701 HISTORIC BUILDINGS

AJ701.1 General. For historic building requirements, *see* 780 CMR 34.00: *Existing Building Code*.

Appendix K: SOUND TRANSMISSION (Adopted in full)

Appendix L: PERMIT FEES (*see* 801 CMR 4.00: *Rates*, as applicable) (Reserved)

Appendix M: HOME DAY CARE – R-3 OCCUPANCY (Reserved)

Appendix N: VENTING METHODS (Reserved)

Appendix O: AUTOMATIC VEHICULAR GATES (Adopted in full)

Appendix P: SIZING OF WATER PIPING SYSTEM (Reserved)

Appendix Q (Reserved)

Appendix R: LIGHT STRAW-CLAY CONSTRUCTION (Reserved)

Appendix S: STRAWABLE CONSTRUCTION (Reserved)

Appendix T: RECOMMENDED PROCEDURE FOR WORST-CASE TESTING OF ATMOSPHERIC VENTING SYSTEMS UNDER N1102.4 OR N1105 CONDITIONS ≤ 5 ACH_{50} (Reserved)

Appendix U: SOLAR-READY PROVISIONS – DETACHED ONE- AND TWO-FAMILY DWELLINGS, MULTIPLE SINGLE-FAMILY DWELLINGS (TOWNHOUSES) (Adopted as modified herein)

Delete Appendix U

Delete IECC Appendix RA and replace with Appendix RA as follows:

SECTION RA101 SCOPE

AU101.1 General. These provisions shall be applicable for new construction, except additions.

51.00: continued

SECTION RA102 GENERAL DEFINITIONS

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 multiple single-family dwellings (townhouses) with not less than 600 ft^2 (55.74 m^2) of roof area oriented between 110° and 270° 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% 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 Construction Document Requirements for Solar-ready Zone. Construction documents shall indicate the solar-ready zone where applicable.

RA103.3 Solar-ready Zone Area. The total solar-ready zone area shall consist of an area not less than 300 ft^2 (27.87 m^2) exclusive of mandatory access or set back areas as required by 527 CMR: *Board of Fire Prevention Regulations*. New multiple single-family dwellings (townhouses) three stories or less in height above grade plane and with a total floor area less than or equal to 2,000 ft^2 (185.8 m^2) per dwelling shall have a solar-ready zone area of not less than 150 ft^2 (13.94 m^2). The solar-ready zone shall be composed of areas not less than five feet (1,524 mm) in width and not less than 80 ft^2 (7.44 m^2) exclusive of access or set back areas as required by 527 CMR.

RA103.4 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 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 Reserved.

RA103.8 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.

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 in AA103 and AA104. These requirements replace all previous stretch energy code requirements.

51.00: continued

AA103 New Buildings.

AA103.1 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 2018 section R406 of 780 CMR 51.00 and all mandatory requirements of 780 CMR 13.00: *Energy Efficiency* and 51.00, as applicable.

AA103.2 Large Area and High Energy Use Buildings. All buildings over 100,000 ft^2, and new supermarkets, laboratories and conditioned warehouses over 40,000 ft^2 shall comply with 780 CMR 13.00: *Energy Efficiency* and shall demonstrate energy use per ft^2 at least 10% below the energy requirements of ANSI/ASHRAE/IESNA 90.1 *Appendix G* Performance Rating Method on either a site or source energy basis. The additional efficiency package options selected in accordance with C406.1 shall be included in calculating the baseline building performance value.

Exception: Exclusively R-use buildings complying with AA103.1 dwelling unit requirements.

AA103.3 Other New Buildings. New buildings not covered in AA103.1 and AA103.2 shall comply with 780 CMR 13.00: *Energy Efficiency* or Chapter 11 of 780 CMR 51.00 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 13.00: *Energy Efficiency* or Chapter 11 of 780 CMR 51.00 shall be used as applicable based on the use and occupancy of the building.

NON-TEXT PAGE