CHAPTER 13 – ENERGY EFFIENCY – AMENDMENTS

The ninth edition building code became first effective on October 20, 2017, and, with a shortened concurrency period, the new code came into full force and effect on January 1, 2018. Chapter 13 was further amended on February 7, 2020, with a concurrency period to end on August 7, 2020.

The new, ninth edition code is based on modified versions of the following 2015 International Codes, as published by the International Code Council (ICC). The one exception is the energy portions are based on the 2018 International Energy Conservation Code as of February 7, 2020.

- The International Building Code (IBC);
- International Residential Code (IRC);
- International Existing Building Code (IEBC);
- International Mechanical Code (IMC);
- International Energy Conservation Code (IECC);
- International Swimming Pool and Spa Code (ISPSC);
- Portions of the International Fire Code.

Massachusetts amends these code fairly significantly to accommodate for unique issues in the commonwealth. This package of amendments revise the IBC, IEBC, IMC, and IECC.

Please remember that the Massachusetts amendments posted on-line are *unofficial versions* and are meant for convenience only. Official versions of the Massachusetts amendments may be purchased from the State House Bookstore @ Shop the Bookstore and any of the I-Codes may be purchased from the International Code Council (ICC) @ iccsafe.org.

Additionally, the ICC publishes transition documents that identify changes from the 2009 to the 2015 and the 2015 to the 2018 I-Codes for those who may have interest.

- International Building code (IBC) Transition
- International Residential Code (IRC) Transition

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	1.20
Steam	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.