CHAPTER 11 – ENERGY EFFICIENCY - 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.

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 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 (IFC).

Massachusetts amends these code fairly significantly to accommodate for unique issues in the commonwealth. This package of amendments revises the IRC only. Please see base code amendments for changes to other listed codes that comprise the ninth edition.

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 I-Codes for those who may have interest.

- **International Building Code (IBC) Transition**
- **International Residential Code (IRC) Transition.**

Note: *The residential code is part of the overall building code, which is referred to as 780 CMR. It is considered to be Chapter 51 in the overall code, which is why you will see reference to 780 CMR Chapter 51 in the amendments. The residential code is applicable to detached one- and two-family dwellings, multiple-family dwellings (townhouses) not more than three stories in height above the grade plane an\or their accessory structures not more than three stories in height above grade. See the base code for other building types.*

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*-2015 ("IECC"), as amended by Chapter 11 of 780 CMR 51.00.

N1101.1 (R401.1) Revise the section as follows:

N1101.1 (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*.

N1101.6 (R202) Add and/or revise the following defined terms:

CLEAN BIOMASS STOVE. Wood- or pellet-fired stoves that are EPA certified; and have a particulate matter emissions rating of no more than 3.5 g/hr for non-catalytic wood and pellet stoves; or 2.0 g/hr for catalytic wood and pellet stoves.

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.

N1101.13 (R401.13) Revise the section as follows:

N1101.13 (R401.2) Compliance. Projects shall comply with one of the following:

1. Sections N1101.14 (R401.3) through N1104 (R404).
2. Section N1105 (R405) and the provisions of sections N1101.14 (R401.3) through N1104 (R404) labeled "Mandatory."
3. An energy rating index ("ERI") approach, or approved alternative energy performance rating method in section N1106 (R406) and the provisions of sections N1101.14 (R401.3) through N1104 (R404) labeled "Mandatory." Qualifying approaches under N1106 (R406) include the following:
   a. Certified RESNET HERS rating with Massachusetts amendments.
   b. Certified Energy Star Homes, Version 3.1.
   c. Certified Passivehaus performance method.

N1101.14 (R401.3) Add the following to the end of the paragraph:

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

51.00: continued

Table N1102.1.2 (R402.1.2) Revise the table as follows:

Climate Zone 5 and Marine 4 Fenestration U Factor shall be "0.30".

Table N1102.1.4 (R402.1.4) Revise the table as follows:

Climate Zone 5 and Marine 4 Fenestration U Factor shall be "0.30".

N1102.1.5.1 (R402.1.5.1) Add the subsection as follows:

N1102.1.5.1 (R402.1.5.1) Approved Software for Total UA Alternative: The following software is approved for demonstrating Total UA compliance:

1. REScheck Version 4.6.4 or later, available at: http://www.energycodes.gov/rescheck
2. REScheck-Web available at https://energycode.pnl.gov/REScheckWeb/

N1103.3.3 (R403.3.3) Add the following paragraph before the exception:

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.

N1103.6 (R403.6) Replace the section as follows:

N1103.6 (R403.6) Mechanical Ventilation (Mandatory). 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. Energy Star Homes Version, 3.1;
2. ASHRAE 62.2-2013; or
3. 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

N1103.6.2 (R403.6.2) through N1103.6.6 (R403.6.6) Add the subsections as follows:

N1103.6.2 (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.

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N1103.6.3 (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.

N1103.6.4 (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.

N1103.6.5 (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.

N1103.6.6 (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.

N1104.3 (R404.2) Reserved

N1106.1 (R406.1) through N1106.1.2 Revise and/or add the section and subsections as follows:

N1106.1 (R406.1) Scope. This section establishes criteria for compliance using an Energy Rating Index ("ERI") analysis, or approved alternative energy performance rating methods.

N1106.1.1 (R406.1.1) Approved Alternative Energy Performance Methods. The following rating threshold criteria are sufficient to demonstrate energy code compliance under section N1106 (R406) without calculation of a standard reference design. The mandatory provisions of subsection N1106.2 (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.** PHIUS+ 2015: Passive Building Standard – North America, or another approved software by PHIUS or PHI, where specific space heat demand, as modeled by a certified passive house consultant, is less than or equal to 10 kBTU/ft^2/year.
3. Any other software approved by the Board of Building Regulations and Standards.

51.00: continued

N1106.1.2 (R406.1.2) Documentation. The following documentation is required for energy code compliance under subsection N1106.1.1 (R406.1.1):

1. If using ENERGY STAR Homes, Version 3.1 path:
   a. Prior to the issuance of a building permit, the following item shall be provided to the building official:
      i. A copy of the preliminary HERS rating, based on plans.
   b. Prior to the issuance of a certificate of occupancy, the following items shall be provided to the building official:
      i. A copy of the final ENERGY STAR Homes certificate;
      ii. A copy of the certified HERS rating; and
      iii. A copy of the signed ENERGY STAR Thermal Enclosure System Checklist.
2. If using PHIUS or PHI passive house software:
   a. Prior to the issuance of a building permit, the following items shall be provided to the building official:
      i. A list of compliance features; and
      ii. A statement that the estimated specific space heat demand is "based on plans."
   b. Prior to the issuance of a certificate of occupancy, the following item shall be provided to the building official:
      i. A copy of the final report, submitted on a form that is approved to document compliance with current PHIUS or PHI standards. Said report shall indicate that the finished building achieves a certified passive house consultant-verified specific space heat demand of less than or equal to 10kBTU/ft^2/year.

N1106.3 (R406.3) Add the following sentence to the end of the paragraph:

The RESNET Home Energy Rating System ("HERS") index is the approved ERI approach in the Commonwealth.

N1106.4 (R406.4) Revise the section as follows:

N1106.4 (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 N1106.4 (R406.4) when compared to the ERI reference design prior to credit for onsite renewable electric generation.

N1106.4.1 (R406.4.1) Add the subsection, and associated table, as follows:

N1106.4.1 (R406.4.1) Trade-off for Onsite Renewable Energy Systems. New construction following N1106.3 (R406.3) or existing buildings and additions following N1107.4 (R407.4) 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. Solar photovoltaic array rated at 2.5kW or higher shall offset five HERS points.
2. Clean biomass heating system, solar thermal array, or geothermal heat pump, or a combination of these systems, operating as the primary heating system shall offset five HERS points.
3. Solar thermal array for primary domestic hot water heating or a clean biomass stove shall offset two HERS points.

Note: A clean biomass stove offset may not be combined with a primary heating system offset.

51.00: continued

Table N1106.4.1 (R406.4.1). Maximum HERS Ratings with Onsite Renewable Energy Systems

Renewable Energy Source	Maximum HERS index score [a]	
	New construction	Whole house renovations; additions
None	55	65
Solar PV > 2.5kW; Renewable primary heating system	60	70
Solar PV; Renewable primary heating and solar thermal DHW	62	72
Solar PV & Renewable primary heating and solar thermal DHW	67	77

[a] Maximum HERS rating prior to onsite electric renewable generation in accordance with section N1106.4 (R406.4).

N1106.5 (R406.5) Revise the section as follows:

N1106.5 (R406.5) Verification by Approved Agency. Verification of compliance with section N1106 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+ 2015 or PHI software, verification of compliance shall be completed by a certified passive house consultant.

N1108.1.2 (R502.1.2) Add an exception to the subsection as follows:

Exception: Alternatively, the addition and any alterations that are part of the project shall comply with N1106 (R406) and shall achieve a maximum HERS index using Table N1106.4.1 (R406.4.1).

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.