

780 CMR: MASSACHUSETTS AMENDMENTS TO THE *INTERNATIONAL BUILDING CODE 2021*

CHAPTER 13: ENERGY EFFICIENCY

CHAPTER 1 [CE] SCOPE AND ADMINISTRATION SECTION C103 CONSTRUCTION DOCUMENTS

Add the following to Section C103.2: **C103.2 Information on construction documents.**

14. Solar Ready roof zone in accordance with Appendix CB.
15. EV Ready Spaces locations in accordance with C405.13

Add the following Section C103.2.2:

C103.2.2 COMcheck submittal. The construction documents submitted with the application for permit shall be accompanied by completed COMcheck Envelope, Lighting and Mechanical Compliance Certificates, and a Plan Review Inspection Checklist for the purposes of demonstrating compliance with the energy provisions of 780 CMR 13.00: Energy Efficiency.

CHAPTER 2 [CE] DEFINITIONS Add the following definitions:

ELECTRIC VEHICLE. An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. Informational note: defined as in 527 CMR 12 section 625.2.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE): The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the Electric Vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the Electric Vehicle. Informational note: defined as in 527 CMR 12 section 625.2.

ELECTRIC VEHICLE READY PARKING SPACE (“EV READY SPACE”): A designated parking space which is provided with wiring and electrical service sufficient to provide 240 volt AC Level 2 or equivalent EV charging, as defined by Standard SAE J1772 for EVSE servicing light duty Electric Vehicles.

CHAPTER 3 [CE] GENERAL REQUIREMENTS SECTION C301 CLIMATE ZONES

C301.1 General. Massachusetts is in climate zone 5A.

CHAPTER 4 [CE] COMMERCIAL ENERGY EFFICIENCY SECTION C401 GENERAL Revise Section C401.2 as follows:

C401.2 Application. Commercial buildings shall comply with Section C401.2.1, or C401.2.2, C401.2.3 or C401.2.4

C401.2.1 International Energy Conservation Code. Commercial buildings shall comply with one of the following:

1. Prescriptive Compliance. The Prescriptive Compliance option requires compliance with Sections C402 through C406 and Section C408. Dwelling units and sleeping units in Group R-2 buildings without systems serving multiple units shall be deemed to be in compliance with this chapter, provided that they comply with Section R406.

2. Total Building Performance. The Total Building Performance option requires compliance with Section C407.

Exception: Additions, alterations, repairs and changes of occupancy to existing buildings complying with Chapter 5.

C401.2.2 ASHRAE 90.1. Commercial buildings shall comply with the requirements of ANSI/ASHRAE/IESNA 90.1 as modified by C402.1.5, C402.3, C405.3, C405.4, C405.13 and C406.

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
Multi-family	24%

Add section.

C401.2.3 APPENDIX CC. Commercial buildings may elect to comply with the requirements of IECC Append-x CC - ZERO ENERGY COMMERCIAL BUILDING PROVISIONS

Add section.

C401.2.4 MA Stretch energy code. Commercial buildings may elect to comply with the requirements of CMR 225 22 or 23 – MASSACHUSETTS STRETCH ENERGY CODE, or, the MUNICIPAL OPT-IN SPECIALIZED STRETCH ENERGY CODE promulgated by the Massachusetts Department of Energy Resources.

Add section.

C401.2.2 Performance rating method for source energy. 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 basis.

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

Exception: Buildings demonstrating a vertical UA equal or lower than a prescriptive UA calculated in accordance with TABLE C402.1.4

$A + B + C \leq \text{Zero (Equation 4-2)}$

Where:

A = Sum of the (UA Dif) values for each distinct assembly type of the building thermal envelope, other than slabs on grade and below-grade walls.

UA Dif = UA Proposed – UA Table.

UA Proposed = Proposed U-value \times Area Proposed.

UA Table = (U-factor from Table C402.1.3, C402.1.4 or C402.4) \times vertical fenestration Area baseline.

B = Sum of the (FL Dif) values for each distinct slab-on-grade perimeter condition of the building thermal envelope.

FL Dif = FL Proposed – FL Table.

FL Proposed = Proposed F-value \times Perimeter length.

FL Table = (F-factor specified in Table C402.1.4) \times Perimeter length.

C = Sum of the (CA Dif) values for each distinct below-grade wall assembly type of the building thermal envelope.

CA Dif = CA Proposed – CA Table.

CA Proposed = Proposed C-value × Area.

CA Table = (Maximum allowable C-factor specified in Table C402.1.4) × Area.

C402.3 Rooftop solar readiness (Mandatory). Follow Appendix CB: Solar-ready zone – Commercial.

Modify Vertical fenestration U-factors in TABLE C402.4:

TABLE C402.4 BUILDING ENVELOPE FENESTRATION MAXIMUM U-FACTOR AND SHGC REQUIREMENTS

Vertical fenestration U-factor

Fixed fenestration 0.30

Operable fenestration 0.32

C402.6 Approved calculation software tools. The following software tools are sufficient to demonstrate compliance with Section C401.2.1 Prescriptive Compliance.

COMcheck-Web available at: <https://www.energycodes.gov/comcheck>

SECTION C403 BUILDING MECHANICAL SYSTEMS

SECTION C404 SERVICE WATER HEATING

SECTION C405 ELECTRICAL POWER AND LIGHTING SYSTEMS C405.2.4

Daylight-responsive controls. Daylight responsive controls complying with Section C405.2.4.1 shall be provided to control the general lighting within daylight zones in the following spaces:

1. Spaces with a total of more than 100 watts of general lighting within primary sidelit daylight zones complying with Section C405.2.4.2.
2. Spaces with a total of more than 300 watts of general lighting within sidelit daylight zones complying with Section C405.2.4.2.
3. Spaces with a total of more than 100 watts of general lighting within toplit daylight zones complying with Section C405.2.4.3.

C405.13 Electric Vehicle Ready Parking Spaces (“EV Ready Spaces”) (Mandatory). Group A-1, B, E, I, M and R buildings with new parking spaces shall provide EV Ready Spaces in accordance with Table C405.13. Installed wiring suitable for 6.6kW or higher SAE J1772-2017 AC Level II EVSE shall be connected to the service panel and run to within 6 feet (1828mm) of any qualifying parking space. Conductors and outlets for EVSE shall be sized and installed in accordance with the MA electrical code.

Table C405.13 EV-READY SPACE REQUIREMENTS

# of Parking Spaces	Minimum # of EV Ready Spaces
10	
2 - 6	1
7 – 13	2
14 - 20	3

21 - 40	4
41 plus	10%, but not more than 16 spaces

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 are excluded from the EV-ready space percentage calculation.
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. One or more AC Level II spaces may be substituted with multiple AC Level I spaces provided with wiring for a minimum 20amp, 120-volt EVSE, with a ratio of at least 3 AC Level I spaces for each AC Level II space required.
4. Any parking facility with 4 or more spaces providing installed Direct Current fast charging EVSE with a minimum charging speed of 150 kW to each space.
5. Parking spaces specifically designated for medium or heavy-duty vehicles are excluded from the EV-ready space percentage calculation.

C405.13.1 Add Section C405.13.1 as follows:

C405.13.1 Minimum Charging Performance Requirements. Automatic Load Management Systems (ALMS) may be used to control electric vehicle loads for EV-Ready or EVSE-Installed Spaces with AC Level II or Level I charging, subject to the performance requirements in Table C405.13.1. The maximum number of parking spaces that may share a single branch circuit varies based on the percentage of all parking spaces to be provided with EVSE.

TABLE C405.13.1 EV-READY PERFORMANCE REQUIREMENTS

Circuit Breaker Amperage	Maximum Parking Spaces that May Share a Branch Circuit with 10% or more EV Ready spaces
40A	2
50A	2
60A	4
70A	6
80A	8
90A	9
100A	10

C405.13.2 Add Section C405.13.2 as follows:

C405.13.2 Identification. Construction documents shall indicate the branch circuit termination point and proposed location of future EVSE. Construction documents shall also provide information on amperage of future EVSE, wiring schematics, Automatic Load Management Systems, and electrical load calculations to verify that the electrical panel service capacity and electrical system, including any on-site distribution transformers, have sufficient capacity to simultaneously charge all EVs at all required EV ready spaces.

SECTION C406 ADDITIONAL EFFICIENCY REQUIREMENTS (Note revised format in IECC2021 to a points table, so needs extensive formatting revisions to replicate existing MA amendments)

C406.1 Additional energy efficiency credit requirements. New buildings shall achieve a total of 15 credits from Tables C406.1(1) through C406.1(5) where the table is selected based on the use group of the building and from credit calculations as specified in relevant subsections of Section C406.

Where a building contains multiple-use groups, credits from each use group shall be weighted by floor area of each group to determine the weighted average building credit. Credits from the tables or calculation shall be achieved where a building complies with one or more of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8.
8. Reduced air infiltration in accordance with Section C406.9
9. Where not required by Section C405.12, include an energy monitoring system in accordance with Section C406.10.
10. Where not required by Section C403.2.3, include a fault detection and diagnostics (FDD) system in accordance with Section C406.11.
11. Efficient kitchen equipment in accordance with Section C406.12.
12. Renewable space heating in accordance with Section C406.13.
13. Type IV heavy timber construction in accordance with Section C406.14.

C406.13. Renewable space heating. All space heating shall be provided with cold-climate air source heat pumps having rated coefficient of performance (COP) of at least 1.75 at 5 degrees Fahrenheit source air. (10 points)

C406.14 Heavy Timber construction. In buildings with 4 stories or more of Type IV heavy timber construction either above grade, or above a podium. (8 points)

SECTION C407 TOTAL BUILDING PERFORMANCE SECTION

C407 BUILDING PERFORMANCE CERTIFICATION METHODS

C407.1 Scope. The following sections C407.1.1 or C407.1.2 are approved performance certification methods to demonstrate compliance 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 HERS Index (HERS) for multi-family buildings. For residential units within a building up to 5 stories above grade plane, a HERS rater verified HERS Index (HERS) score of 52 or less for each finished unit, together with a completed and HERS rater verified set of ENERGY STAR Multifamily New Construction (MFNC) program. Checklists may be used.

C407.1.2 Passive House Institute US (PHIUS) or Passive House Institute (PHI) certification. Projects design certified (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 HERS-based compliance. Compliance based on an HERS analysis requires that the rated design be shown to have an HERS Index less than or equal to 52 when compared to the HERS reference design prior to credit for onsite renewable electric generation. The Home Energy Rating Index (HERS) shall be determined in accordance with RESNET/ICC standard 301.

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

1. A HERS compliance report which includes a proposed HERS index score of 52 or lower;
2. A description of the unit's energy features;
3. A statement that the rating index score is "based on plans".

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

4. A copy of the final certificate indicating that the HERS rating index score for each unit is verified to be 52 or less;
5. A completed HERS rater verified ENERGY STAR Thermal Enclosure System Rater Checklist.

C407.5.2 Documentation. Compliance with Phius or PHI shall be in accordance with C407.5.2.1 or C407.5.2.2

C407.5.2.1 Phius Documentation. When using WUFI Passive or other Phius approved software:

1. Prior to the issuance of a building permit, the following item(s) must be provided to the Building Official:
 - a. A Phius 2021 (or newer) Verification Report which demonstrates project compliance with Phius 2021 (or newer) performance requirements.
 - b. A statement from the CPHC that the verification report results accurately reflect the plans submitted.
 - c. Evidence of project registration from Phius.

OR

- a. A Design Certification Letter from Phius.
2. Prior to the issuance of a final certificate of occupancy, the following items must be provided to the building official:
 - a. Design Certification Letter from Phius.
 - b. An updated Verification Report by the CPHC which reflects "as-built" conditions and test results that demonstrate project compliance with Phius (blower door and ventilation results).
 - c. A statement from the CPHC that the envelope meets the Phius hygrothermal requirements found in Appendix B of the Phius 2021 Certification guidebook
 - d. A statement from the Phius Certified Verifier or Rater that the project test results and other Phius verification requirements are met.
 - e. A copy of the Phius workbook listing all testing results and as-built conditions.

OR

- a. A Project Certificate demonstrating final certification awarded by Phius.

AND

- f. A statement from the Phius Verifier or Rater of compliance with C405.13: EV ready, and Appendix CB: Solar Ready Provisions.

C407.5.2.2 Passive House International (PHI) Documentation.

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

- a. A PHPP compliance report which demonstrates project compliance with current PHI performance requirements;
- b. A statement from the Certified Passive House Consultant/Designer (CPHC/D) that the PHPP results and compliance report accurately reflect the plans submitted;
- c. Evidence of project registration from a Certified Passive House Certifier.

OR

- a. A Design Certification Letter from a Certified Passive House Certifier.

2. Prior to the issuance of a final certificate of occupancy, the following items must be provided to the building official:

- a. A Design Certification Letter from a Certified Passive House Certifier.
- b. An updated PHPP compliance report which reflects “as-built” conditions and test results (blower door and ventilation results) that demonstrates project compliance with PHI performance requirements;
- c. A copy of the Passive House Verifier’s or Rater’s test results;
- d. A statement from the CPHD that the project test results meet the model performance requirements, all the mandatory limits and any other mandatory requirements.

OR

- a. A Final Certification Letter from a Certified Passive House Certifier

AND

- e. A statement from the Passive House Verifier or Rater of compliance with C405.13: EV ready, and Appendix CB: Solar Ready Provisions.

C407.6 Verification by approved agency. Verification of compliance with Section C407 shall be completed by an approved third party. For compliance using an HERS 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 Verifier or Certifier.

CHAPTER 5 [CE] EXISTING BUILDINGS

SECTION C503 ALTERATIONS

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

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