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2023 Massachusetts Commercial Stretch Code
Part 2: Overview of Key Changes

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What is Mass Save®?

- Mass Save® is an initiative sponsored by Massachusetts' gas and electric Program Administrators and energy efficiency service providers, including
  - The Berkshire Gas Company
  - Cape Light Compact
  - Eversource Energy
  - Liberty Utilities
  - National Grid
  - Unitil
- The Sponsors of Mass Save work closely with the Massachusetts Department of Energy Resources to provide a wide range of services, incentives, trainings, and information promoting energy efficiency that help residents and businesses manage energy use and related costs.

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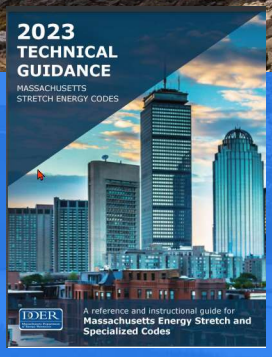
Massachusetts Department of Energy Resources (DOER)

Some of the content of this course is sourced from 2023 Technical Guidance provided by Massachusetts Department of Energy Resources.



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Presented by:

PSD

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Moving Energy Efficiency Forward

We combine building science with technology to help utility providers, program implementers, and building performance professionals achieve energy savings.

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Today's Presenter

Bill Footer
Energy Efficiency Program Manager

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Today's Presenter

Art Pakatar
Senior Manager, Energy Codes Division

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Continuing Education

This webinar is approved for:

- 1-hour CSL CEU
- 1 AIA LU | HSW
- 1 CO CEU
- 1 BPI CEU

Everyone will receive a certificate of attendance via email

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Agenda

- Massachusetts Energy Code
- 2023 Commercial Stretch Energy Code
- Scope and Administration
- Definitions
- Commercial Energy Efficiency
- Compliance Pathways
- Existing Buildings
- Summary

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Learning Outcomes

Upon completion of this training, attendees will . . .

- Have a knowledge of the major changes to the commercial provision of the Stretch Code.
- Be able to apply the appropriate compliance path to a proposed commercial project
- Gain an understanding of how the code addresses thermal bridging in the thermal boundary
- Be familiar with electrification requirements for commercial buildings.

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Poll Question #1

Which of the following best describes your field of work?

A. Builder
B. Architect
C. Code Official
D. HERS Rater
E. Passive House Consultant

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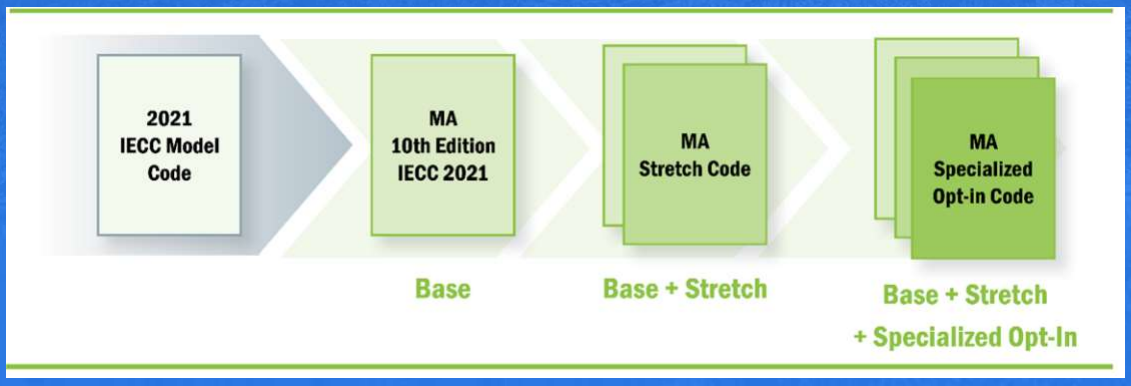
The 2023 Massachusetts Energy Code



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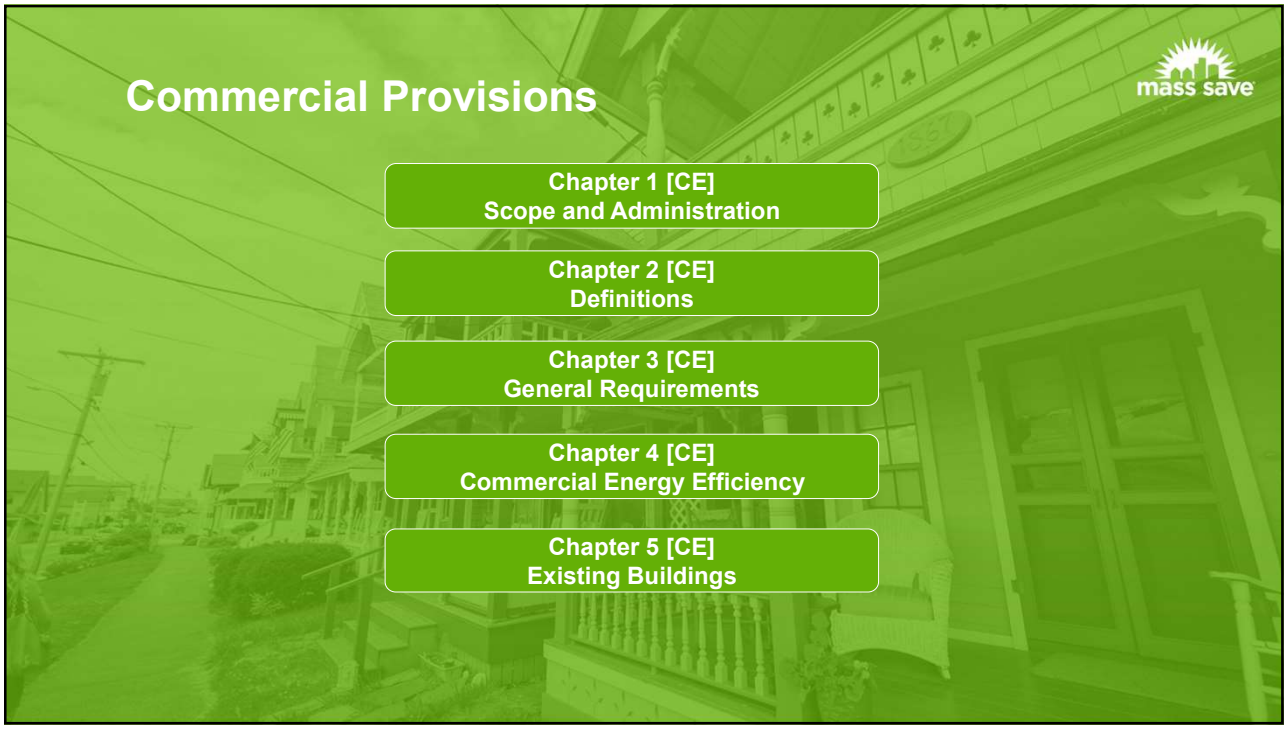
Commercial Provisions
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Chapter 1 [CE]
Scope and Administration
Chapter 2 [CE]
Definitions
Chapter 3 [CE]
General Requirements
Chapter 4 [CE]
Commercial Energy Efficiency
Chapter 5 [CE]
Existing Buildings

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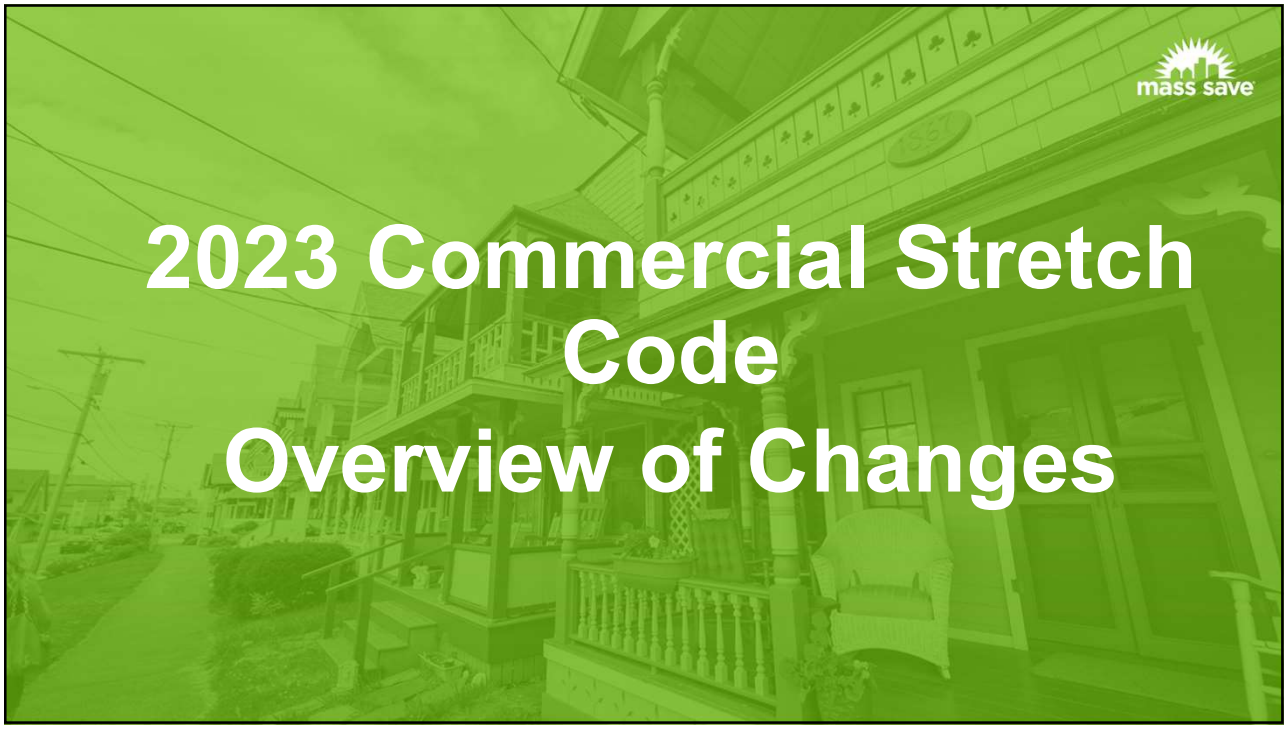
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2023 Commercial Stretch Code
Overview of Changes

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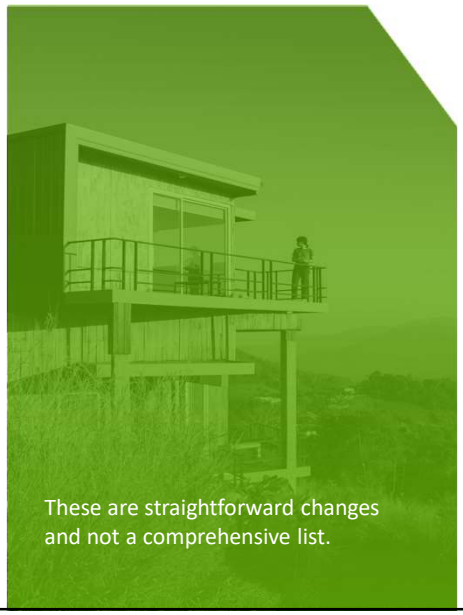
Summary of Minor Code Changes



Code Section	Summary of Measure
C103.2	Adds documentation requirements for Solar Ready, EV Ready Spaces, ventilation rate for Relative Performance (see Additional Information for more guidance), and Mixed-Fuel systems' plans for electrification for the Specialized Code. Clarification of COMcheck submittal documentation.
C202	Adds definitions for All-Electric Building, Automatic Load Management System, Class 3 Exhaust, Class 4 Exhaust, Clean Biomass Heating System, Combustion Equipment, Glazed Wall System, Dedicated Outdoor Air System, Electric Vehicle, Electric Vehicle Ready Parking Space, Enthalpy Recovery Ratio, Exempt Exhaust, Fuel Gas, Fuel Oil, Mixed-Fuel Building, Other Exhaust, Sensible Energy Recovery Ratio, Spandrel Section, Thermal Bridge
C402.2.4.1	Insulation Installation, Delete C402.2.4.1 Exception
C402.2.8	New section listing specifications for fireplaces.
C402.4	Lowers fixed and operable U-factors and makes performance documentation explicit for all fenestration.
C402.6	Approved Calculation Software Tools, Allows MA Stretch COMcheck
C405.2	Lowers existing threshold requiring controls in daylight zones to 100W.
Appendix CB	Solar-Ready Zone – Commercial, included without modification

Simple code measures that don't require further explanation. Refer to code for specific requirements.

Courtesy of DOER: 2023 Technical Guidance, Massachusetts Stretch Energy Codes

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Chapter 1
Scope and Administration

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C103.2 Construction Documents

New Requirements for inclusion on Construction Documents (CDs):

- Compliance Path used for project
- Solar Ready Roof Zone or Potential Solar Zone Area
- EV Ready Spaces
- Relative Performance Pathway ventilation documentation, schedules, and calculations
- For Opt-in Communities – electric HVAC retrofit design

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C103.2.2 COMcheck

ALL Permits Shall Include Completed COM*check including:*

- Envelope Compliance Certificate
- Lighting Compliance Certificate
- Mechanical Compliance Certificates
- Plan Review/Inspection Checklist

Exception:

Projects documenting compliance following Section C407.2 (ASHRAE 90.1 Appendix G) shall follow applicable reporting requirements.

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Chapter 2
Definitions

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Definitions

- Chapter 2 as always includes definitions of terms/words related to the scope applicable to this code.
- Helps maintain the context in which the terms are being used.
- Some new definitions in the version include:

- Dedicated Outdoor Air System (DOAS)
- Thermal Bridge
- Spandrel Section
- Tenant Fit Out Zone
- Enthalpy Recovery Ratio
- Low Glazed Wall System
- High Glazed Wall System
- Sensible Energy Recovery Ratio
- Automatic Load Management System (ALMS)
- Thermal Distribution Efficiency
- Clear Field, Lineal, Point
- Fault Detection and Diagnostics (FDD)
- Mixed-Fuel Buildings

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Chapter 3
General Requirements

NO Major Changes to Report

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Chapter 4
Commercial Energy Efficiency

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Compliance Pathways

Prescriptive Compliance

Nonresidential buildings ≤20,000 sf

Targeted Performance Compliance

Dormitories, fire stations, libraries, offices, schools, police stations, post offices and town halls over 20,000 sf and having average ventilation at full occupancy of 0.5 cfm/sf or less

Relative Performance Compliance

Buildings not required to use Targeted Performance are permitted to use this path

Certified Performance - Passive House

All buildings or spaces are permitted to use Passive House compliance

Certified Performance - HERS Compliance

All Group R buildings and Group R spaces in buildings with multiple dwelling units are permitted to use HERS compliance

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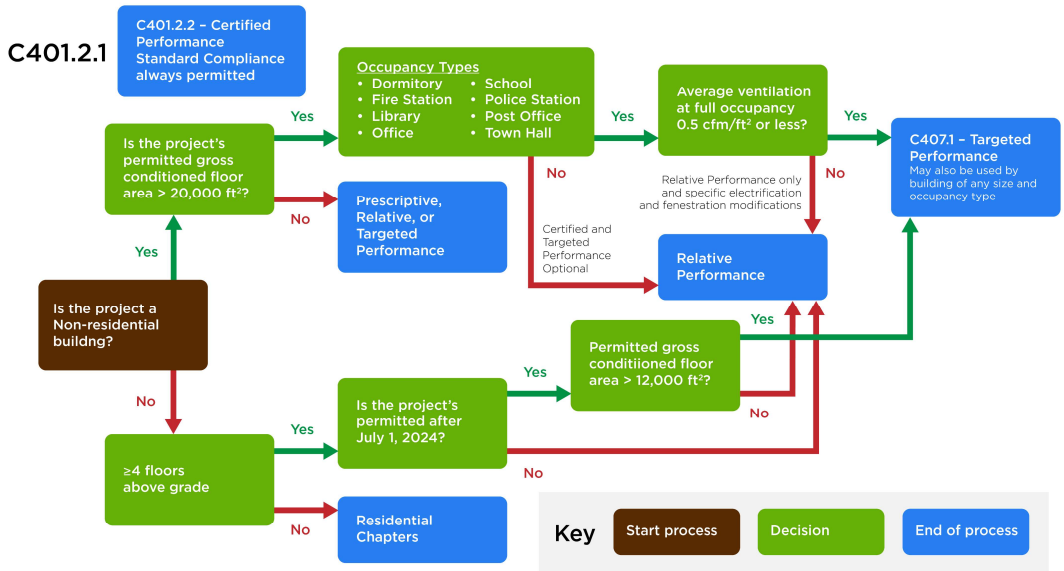
Compliance Path Flow Chart



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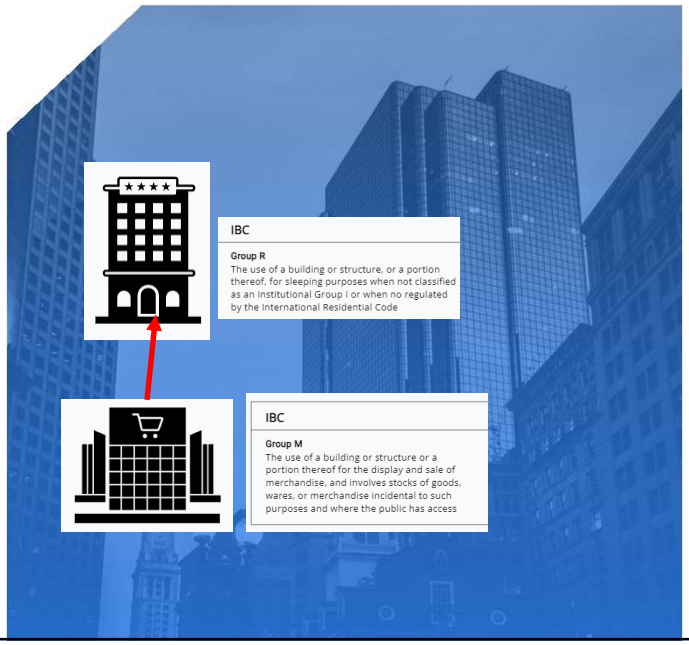
Mixed Use Buildings

- Where there are 2 or more uses within a building each use shall separately and independently show compliance
- Where different compliance paths are required – each use shall follow the appropriate patch



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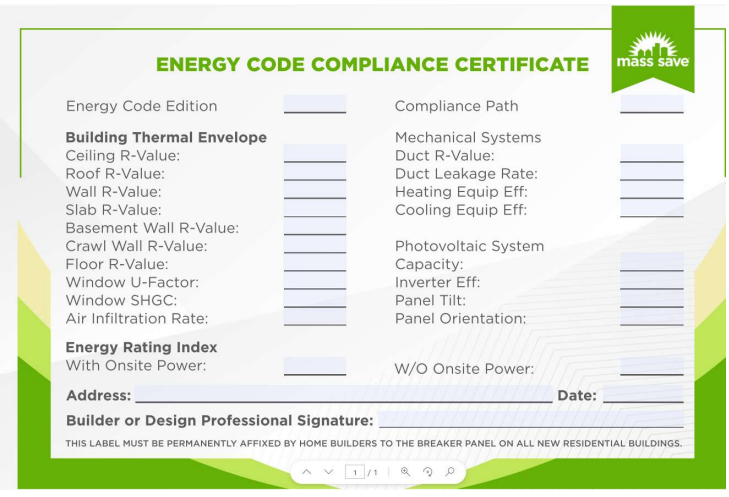
Thermal Envelope Certificate

The 2021 IECC requires a permanent thermal envelope certificate to be posted in the furnace or utility room including

Information required includes:

- R-Values for the envelope components
- U-factors and SHGCs of fenestration
- Results from any building envelope air leakage testing performed on the building



ENERGY CODE COMPLIANCE CERTIFICATE

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Energy Code Edition		Compliance Path	
Building Thermal Envelope		Mechanical Systems	
Ceiling R-Value:		Duct R-Value:	
Roof R-Value:		Duct Leakage Rate:	
Wall R-Value:		Heating Equip Eff:	
Slab R-Value:		Cooling Equip Eff:	
Basement Wall R-Value:			
Crawl Wall R-Value:		Photovoltaic System	
Floor R-Value:		Capacity:	
Window U-Factor:		Inverter Eff:	
Window SHGC:		Panel Tilt:	
Air Infiltration Rate:		Panel Orientation:	
Energy Rating Index			
With Onsite Power:		W/O Onsite Power:	

Address: _____ **Date:** _____

Builder or Design Professional Signature: _____

THIS LABEL MUST BE PERMANENTLY AFFIXED BY HOME BUILDERS TO THE BREAKER PANEL ON ALL NEW RESIDENTIAL BUILDINGS.

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Amended Sections

This table from DOER Technical Guidance illustrates the IECC amended sections that apply for each compliance pathway

Code Requirements		C407.1 Targeted Performance	C407.2 Relative Performance	C407.3 Passive House	C407.4 HERS
C401.3 Thermal envelope certification Requirement to post thermal envelope certificate with the key performance characteristics of the opaque envelope and fenestration and air leakage testing results.		Yes	Yes	Yes	Yes
C401.4.1 Partial Space Heating Electrification		No	Yes	No	No
C401.4.2 Full Space Heating Electrification		Note 1	Note 1	No	No
C402 Building Envelope Requirements	**C402.1.5** Component Performance Alternative Maximum area-weighted U-factor of the opaque above-grade walls and the maximum U-factor of the glazed wall systems specified in either Section C402.1.5.1 or C402.1.5.2 depending on the percentage of the exterior wall taken by glazed wall systems; the maximum SHGC of the glazed wall systems	Yes	Yes	No	No
	C402.2.8 Requirement for combustion fireplaces	Yes	Yes	No	No
	C402.3 Rooftop solar readiness	Yes	Yes	Yes	Yes
	C402.4.6 Fenestration Documentation Allowed methods for determining fenestration performance.	Yes	Yes	No	No
	C402.5 Air Leakage – Thermal Envelope Air barrier design and testing requirements; maximum allowed air leakage rates.	Yes	Yes	No	No
	C402.7 Derating and Thermal Bridges Methodology that must be used to account for thermal bridging losses in exterior walls	Yes	Yes	No	No
C403 Building Mechanical Systems		Yes	No except must meet C403.5 (Economizer) and C403.7 (Exhaust Air Energy Recovery)	No	No
C404 Service Water Heating The minimum equipment efficiency and controls; piping insulation.		Yes	No	No	No
C405 Electric Power and Lighting Systems Interior and exterior lighting power and controls; electric metering; transformers; motors; vertical and horizontal transportation systems and equipment; voltage drop; automatic receptacle controls; energy monitoring; provisions for the electric vehicles ready parking spaces.		Yes	Yes	Yes	Yes
C406 Additional Efficiency Requirements Projects must implement efficiency measures to achieves at least 15 credits.		(Note 2)	(Note 2)	No	No
C408 Maintenance Information and System Commissioning Requirements related to systems commissioning, functional testing and maintenance information.		Yes	Yes	Yes	Yes

Note 1: Full heating electrification is required for high *glazed wall system* buildings (C402.1.5.2) except buildings using Relative Performance Path because average ventilation at full occupancy is greater than 0.5 cfm/sf in which case partial heating electrification is required.

Note 2: Some specified systems and equipment that contribute toward compliance with Section C406 may be included in the whole building energy models and thus contribute toward compliance with the performance thresholds of a given compliance path. Others cannot be modeled as specified following the simulation rules of the given compliance option. **Error! Reference source not found.** shows energy efficiency credits that may contribute toward modeled performance for each performance-based compliance path.

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Building Electrification

- This is a new section!
- Projects following Relative Performance paths require partial electrification (25%)
- High Glazed Wall Projects require full electrification – except they can do partial electrification when following Relative Performance path due to high ventilation rate
- All-Electric pathway of the Specialized Code requires full space and water heating electrification (C401.4.3)

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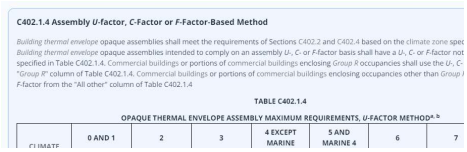
Building Envelope Thermal Requirements

- Insulation R-Value is no longer permitted.
- Vertical assemblies must meet an area-weighted U-factor
- COMcheck –Web is approved for Prescriptive Compliance
- Thermal Bridging mitigation is required – more on that later
- Table C402.1.4 – Assembly U-Factors



C402.1.4 Assembly *U*-factor, *C*-Factor or *F*-Factor-Based Method

Building thermal envelope opaque assemblies shall meet the requirements of Sections C402.2 and C402.4 based on the climate zone spec
Building thermal envelope opaque assemblies intended to comply on an assembly U_a-, C_a- or *F*-factor basis shall have a U_a-, C_a- or *F*-factor not
specified in Table C402.1.4. Commercial buildings or portions of commercial buildings enclosing *Group R* occupancies shall use the U_a-, C_a-
"*Group R*" column of Table C402.1.4. Commercial buildings or portions of commercial buildings enclosing occupancies other than *Group*
F-factor from the "All other" column of Table C402.1.4

TABLE C402.1.4

OPAQUE THERMAL ENVELOPE ASSEMBLY MAXIMUM REQUIREMENTS, *U*-FACTOR METHOD[a, b]

CLIMATE	0 AND 1	2	3	4 EXCEPT MARINE	5 AND MARINE 4	6	7

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Component Performance Alternative

- This section allows for more flexible glazing limits.
- Differentiates between low glazed and high glazed wall systems
- Tradeoffs between roof/floors and walls/windows are not allowed.
- “Intra-vertical” tradeoffs are allowed
- Thermal Bridging still must be addressed
- Provides U-factor area-weighting for Prescriptive Compliance
- Prepares inputs for Appendix G calculations

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Low Glazed Wall System Buildings

- Glazed Wall System area is **not greater** than 50% of the above-grade wall area
- Low Glazed Wall System **max. allowed** area-weighted U-factor is U=0.1285
- Maximum allowed vision glass assembly is U=0.25

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High Glazed Wall System Buildings

- Glazed Wall System area **is greater** than 50% of the above-grade wall area
- High Glazed Wall System max. allowed area-weighted U-factor is U=0.1600
- Maximum allowed vision glass assembly is U=0.25

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Poll Question # 2

Which one of the following conditions require full electrification?

A. Buildings with Low Glazed Walls
B. Buildings with ventilation rate greater than 0.5 cfm/sf
C. Buildings using the Relative Performance Path
D. Buildings with High Glazed Walls

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Air Leakage- Thermal Envelope (C402.5)

- ✓ Air Leakage Testing is Mandatory
- ✓ Tested by approved third party
- ✓ All Prescriptive and Performance Compliance pathways require compliance
- ✓ Two testing options:
  - Whole-building
  - Dwelling units
- ✓ Options for buildings over 100,000SF
- ✓ Max. Allowance: 0.35cfm/SF @ 75Pa
- ✓ Group R and I buildings can use a different standard (allowance 0.27 cfm/SF)

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C402.7 Derating and Thermal Bridging

New section – includes exterior insulation layers.

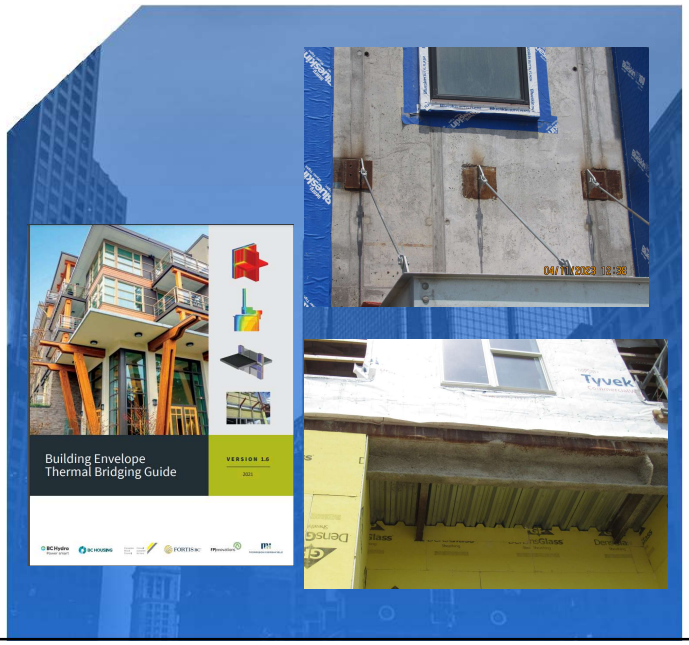
Also addressed opaque portions of glazed wall systems

Required for all Prescriptive and Performance paths.

Must include method and selections on CDs

Reference: "Building Envelope Thermal Bridging Guide by BC Hydro/BS Housing Research Center)

Look for upcoming course on Thermal Bridging and Derating



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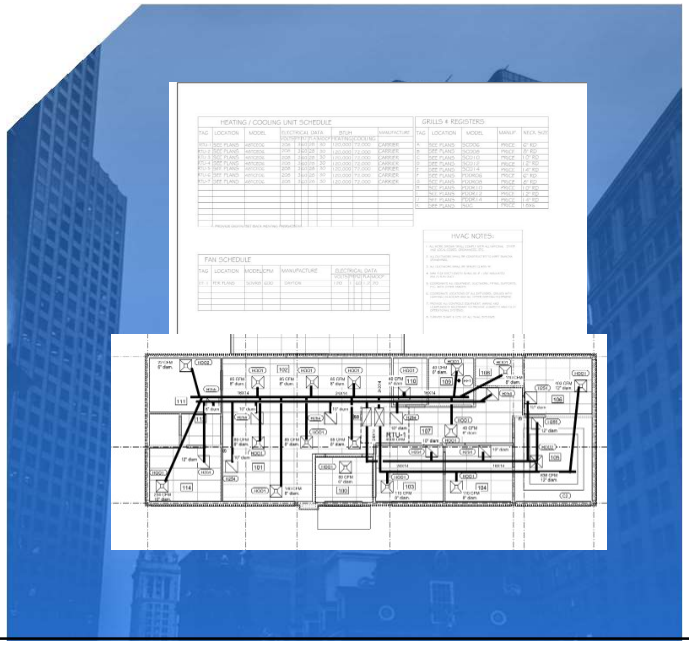
Building Mechanical Systems

C403.2.1 Zone Isolation Is Required

- ✓ Zones >25,000sf in floor area
  or
- ✓ Spanning more than 1story . . .
  Shall be divided into isolated areas

- ✓ Each area must be equipped with isolation devices and controls to control the supply of conditioned and exhaust air into the zone.



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Poll Question # 3

Air Leakage Testing is Required in all buildings except those over 50,000 sq.ft.

A. TRUE
B. FALSE

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Building Mechanical Systems

C403.2.3 Fault Detection Diagnostics (FDD)

Required on new buildings of 100,000 sf or larger

FDD system to include:

- ❑ Include permanently installed sensors to monitor performance
- ❑ Sample performance at 15 min. intervals
- ❑ Automatically identify and report faults
- ❑ Automatically provide prioritized recommendations for repairs
- ❑ Be capable of transmitting recommendations to authorized personnel

Exceptions: R1 & R2 occupancies

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Building Mechanical Systems

C403.4.1.1 Heat Pump Supplementary Heat

HP w/ supplementary electric resistance heat shall have controls that limit supplemental heat operation to one of the following conditions:

- ✓ Vapor compression cycle cannot meet the demand for the set point temperature
- ✓ HP is in defrost mode
- ✓ Vapor Compression cycle malfunctions
- ✓ Thermostat malfunctions

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Building Mechanical Systems

- Multiple-zone HVAC systems shall include controls that are capable of and configured to automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperature.
- The controls shall be configured to reset the supply air temperature not less than 25 percent of the difference between the design supply-air temperature and the design room air temperature.

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Building Mechanical Systems

Energy Recovery Systems

Required for:

- Non-transient Dwelling Units
  - Enthalpy Recovery Ratio not less than 50% cooling; 75% heating
- Spaces other than Non-transient Dwelling Units
  - Required when supply airflow rate of a fan system (dwelling unit) exceeds Tables C403.7.4.2(1) and C403.7.4.2(2)
  - Sensible Energy Recovery Ratio at least 50% heating – Class 3 or Class 4 Exhaust
  - Enthalpy Recovery Ration not less than 70% heating & cooling for all other

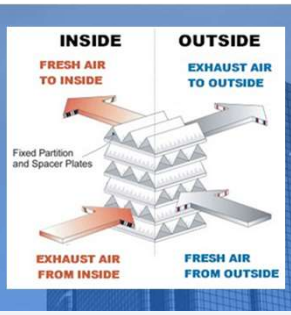

TABLE C403.7.4.2(1)

ENERGY RECOVERY REQUIREMENT (Ventilation systems operating less than 8,000 hours per year)

CLIMATE ZONE	PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE							
	≥=10% and <20%	≥=20% and <30%	≥=30% and <40%	≥=40% and <50%	≥=50% and <60%	≥=60% and <70%	≥=70% and < 80%	≥=80%
	Design Supply Fan Airflow Rate (cfm)							
5A	10,000	8,000	2,750	0	0	0	0	0

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Building Mechanical Systems

C403.8.5 Low-Capacity Ventilation Fans

Mechanical Ventilation fans <1/12 HP in capacity shall meet the efficacy requirements of Table C403.8.5 at one or more rating points

Exceptions:

1. Fan is part of heating/cooling system
2. Dryer exhaust duct power ventilators, domestic range hoods and domestic range booster fans that operate intermittently

TABLE C403.8.5

LOW-CAPACITY VENTILATION FAN EFFICACY[a]

FAN LOCATION	AIRFLOW RATE MINIMUM (CFM)	MINIMUM EFFICACY (CFM/WATT)	AIRFLOW RATE MAXIMUM (CFM)
HRV or ERV	Any	1.2 cfm/watt	Any
In-line fan	Any	3.8 cfm/watt	Any
Bathroom, utility room	10	2.8 cfm/watt	< 90
Bathroom, utility room	90	3.5 cfm/watt	Any

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Building Mechanical Systems

C404.2 Service Water-Heating Equipment Performance Efficiency

Water-heating equipment and hot water storage tanks shall meet Table C404.2

Manufacturer's published data sheets to be provided.

Also applies to water-heating equipment used for space heating

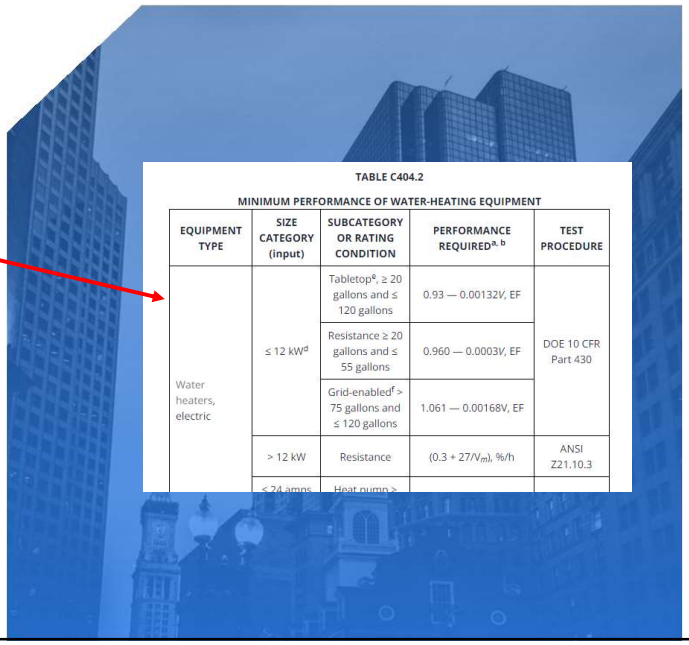

TABLE C404.2

MINIMUM PERFORMANCE OF WATER-HEATING EQUIPMENT

EQUIPMENT TYPE	SIZE CATEGORY (input)	SUBCATEGORY OR RATING CONDITION	PERFORMANCE REQUIRED[a, b]	TEST PROCEDURE
Water heaters, electric	≤ 12 kW[d]	Tabletop[e], ≥ 20 gallons and ≤ 120 gallons	0.93 — 0.00132*V*, EF	DOE 10 CFR Part 430
		Resistance ≥ 20 gallons and ≤ 55 gallons	0.960 — 0.0003*V*, EF	
		Grid-enabled[f] > 75 gallons and ≤ 120 gallons	1.061 — 0.00168*V*, EF	
	> 12 kW	Resistance	(0.3 + 27/V_m), %/h	ANSI Z21.10.3
	≤ 24 amps	Heat pump ≥		

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Lighting for Dwelling Units

- 90% (min) High Efficacy lighting is required in all permanently installed lighting
- Exceptions Appliance lighting

High-efficacy light sources:

- Lamps with at least 65 lumens per watt
- Luminaires with at least 45 lumens per watt

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Occupancy Sensor Controls

Required areas added:

- Corridors
- Warehouse Storage Areas
- Must incorporate a manual off switch

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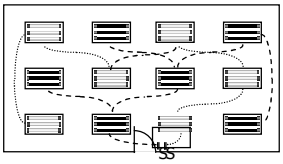
Light-reduction Controls- C405.2.3

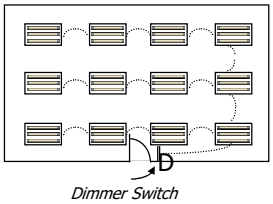
Light Reduction Controls must allow the occupant to reduce connected lighting load

- By not less than 50%
- In a reasonably uniform illumination pattern

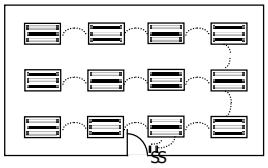
Alternating Luminaires



Dimming



Alternating Lamps



Exception: Light Reduction Control **Not** required in daylight zones with daylight responsive controls complying with C405.2.3

Image: DOE

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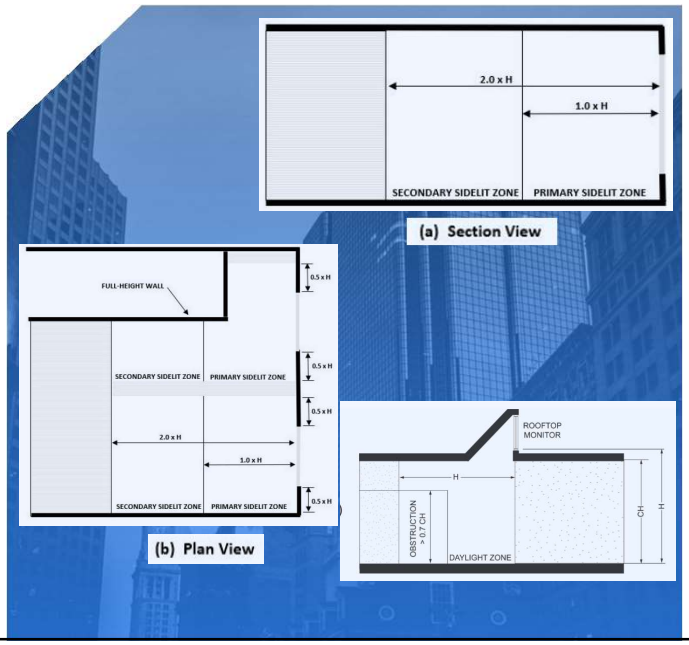
C405.2.4.2 Sidelit Daylight Zone

The Sidelit Daylight Zone requirements have changed.

Added:

- Requirements for roof top monitors
- Secondary sidelit daylight zone
- Visible transmittals not less than 0.20
- Added requirements of projection factor



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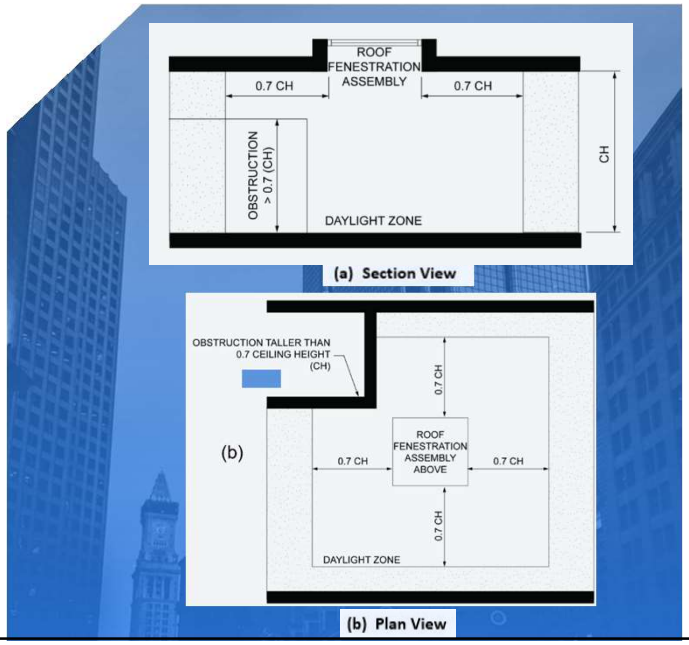
C405.2.4.3 Toplit Daylight Zone

The toplit daylight zone is the floor area underneath a roof fenestration assembly that complies with all the following:

- To nearest obstruction that is taller than 0.7 times the ceiling height or up to 0.7 times the ceiling ht., whichever is less.
- Direct sunlight is not blocked from hitting the roof fenestration assembly at the peak solar angle on the summer solstice by buildings or geological formations
- The product of the visible transmittance of the roof fenestration assembly and the area of the rough opening of the roof fenestration assembly divided by the area of the toplit zone is not less than 0.008



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C405.2.8 Parking Garage Lighting Control

Parking garage lighting shall be controlled by an occupant sensor or a time-switch control

- Lighting power to each luminaire shall be automatically reduced by not less that 30% when not activity for 20 minutes
- Lighting zones to be no more than 3600 SF
- Separately control and reduce power by 50% areas with lighting is provided for eye adaptation
- Power to luminaires within 20 feet of the perimeter walls shall have daylight responsive controls to reduce power by at least 50%

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C405.11 Automatic Receptacle Control

50% of all 125V 15-and 200amp receptacles installed in:

- Offices
- Conference Rooms
- Rooms used for printing
- Breakrooms
- Classrooms
- Workstations

25% of branch circuit feeder to modular workstations not shown on CDs

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C405.12
Energy Monitoring

Required in new buildings w/ CFA of ≥25,000 sf

Systems must:

- Measure
- Monitor
- Record
- Report consumption data

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C406 Additional Efficiency Requirements

1. C406.1 -New Buildings are required to achieve a min. of 15 credits
2. C406.2 - Tenant Spaces are required to achieve a min. of 10 credits

Credits based on Table C406.1

TABLE C406.1(1)
ADDITIONAL ENERGY EFFICIENCY CREDITS FOR GROUP B OCCUPANCIES

SECTION	CLIMATE ZONE																
	0A & 1A	0B & 1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.2.2: 5% cooling efficiency improvement	6	6	5	5	4	4	3	3	3	2	2	2	1	2	2	2	1
C406.2.3: Renewable space heating	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	15	1	1	2	2	NA	1

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Compliance Paths

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SCENARIO	PATHWAY NAME	WHAT CODE and SOFTWARE
Less than 20,000-sf	Prescriptive	Based on IECC2021, No modeling, can use COMcheck Web MA Stretch version
Over 20,000-sf and residential, office, dorm, fire station, library, school, police station, post office, or town hall	"Targeted" performance	TEDI path – can use Equest (or other) model – show heating/cooling demand below limits
More than 20,000-sf and not use above, or any use for high ventilation building	"Relative" performance	ASHRAE 90.1 Appendix G - can use Equest (or other) model – show EUI improvement over baseline
Passivehouse	Passivehouse	Passivehouse Certified - can use WUFI or PHPP models, and certify with PHIUS or PHI
HERS (Group R Buildings)	HERS	HERS Certified, work with HERS rater – can use Ekotrope or REMrate

Courtesy of DOER: 2023 Technical Guidance, Massachusetts Stretch Energy Codes

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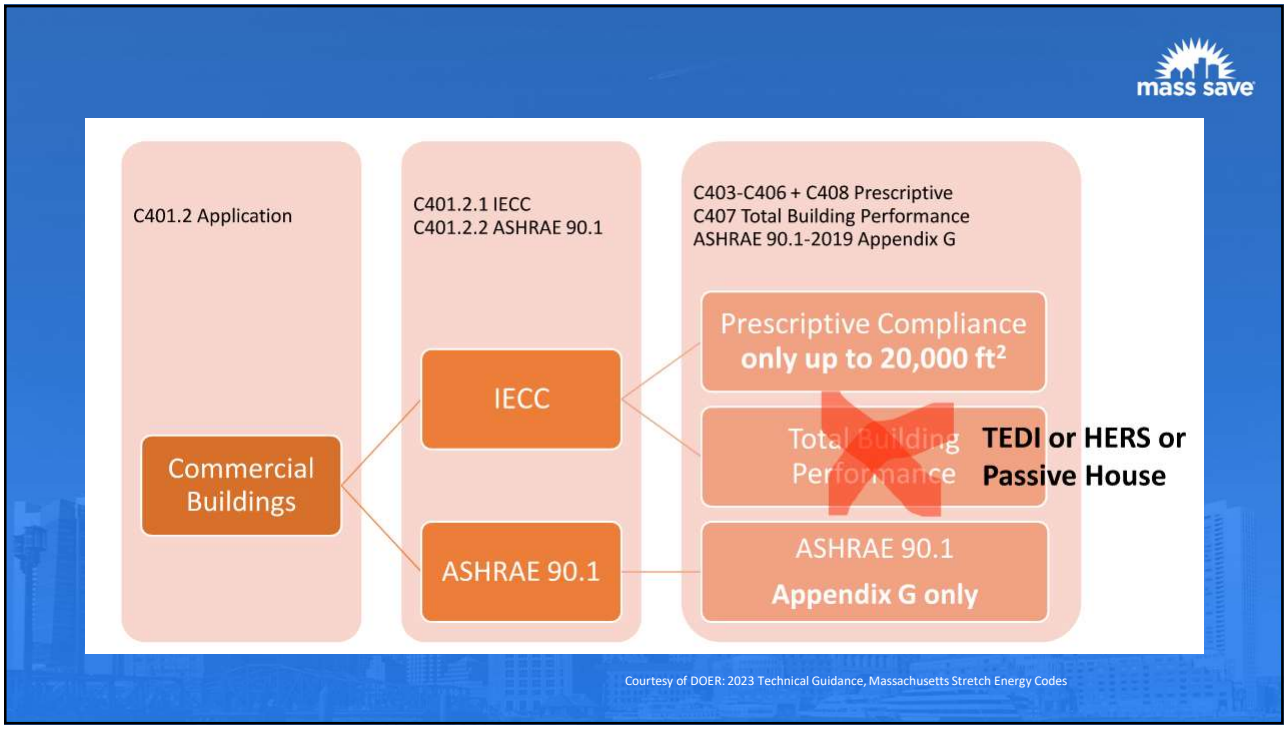

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Poll Question # 4

Given:
30,000 SF, Dormitory, 3 stories tall.
Ventilation rate at peak is 0.60cfm/sf.
What is required compliance path?

A. Prescriptive Path
B. Targeted Performance Path
C. Relative Performance Path
D. ERI (HERS) Index

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C402	• Building Envelope Requirements
C403	• Building Mechanical Systems
C404	• Service Water Heating
C405	• Electrical Power and Lighting Systems
C406	• Additional Efficiency Requirements
C408	• Maintenance Information and system commissioning

C403-C406 + C408 Prescriptive

Prescriptive Compliance

Courtesy of DOER: 2023 Technical Guidance, Massachusetts Stretch Energy Codes

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Commercial Code

		IECC 2018	IECC 2021
Envelope	Fenestration	**Skylight:** U 0.50 (CZ 4-8) **Vertical (fixed):** U 0.38- 0.29 (CZ 4-8)	**Skylight:** U 0.50- 0.41 (CZ 4-8) **Vertical (fixed):** U 0.36- 0.26 (CZ 4-8)
	Opaque Surfaces	N/A	Updated to align with ASHRAE 90.1 2016 & 2019 for all surfaces
Refrigeration Efficiency		N/A	Updated to match federal requirements
Lighting		**Office**: 0.79 **School**: 0.81 **Hospital**: 1.05	**Office**: 0.64 **School**: 0.72 **Hospital**: 0.96

Source: NEEP, Key Changes in the 2021 IECC for the Northeast and Mid-Atlantic

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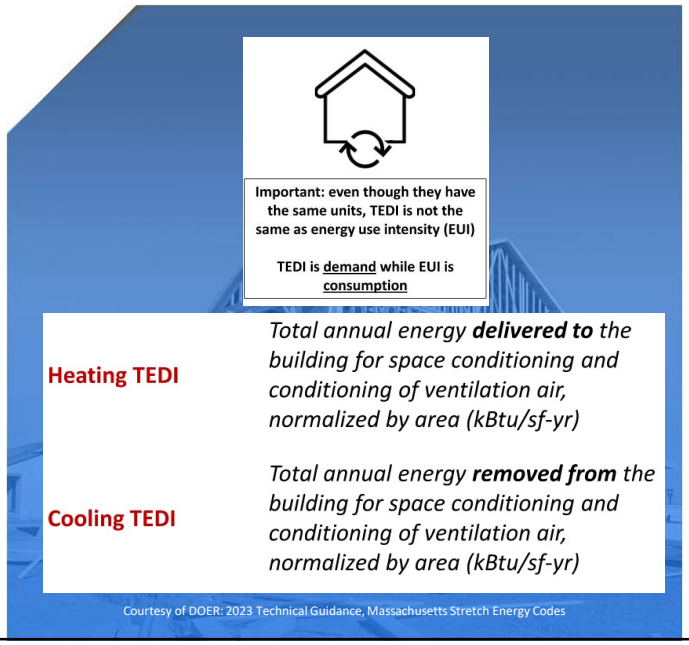
Targeted Performance Pathway (TEDI)

- Stretch Code now directly regulated heating and cooling demand for:
- Office
- Municipal buildings
- Schools
- Residential Buildings



Important: even though they have the same units, TEDI is not the same as energy use intensity (EUI)

TEDI is demand while EUI is consumption

Heating TEDI

*Total annual energy **delivered to** the building for space conditioning and conditioning of ventilation air, normalized by area (kBtu/sf-yr)*

Cooling TEDI

*Total annual energy **removed from** the building for space conditioning and conditioning of ventilation air, normalized by area (kBtu/sf-yr)*

Courtesy of DOER: 2023 Technical Guidance, Massachusetts Stretch Energy Codes

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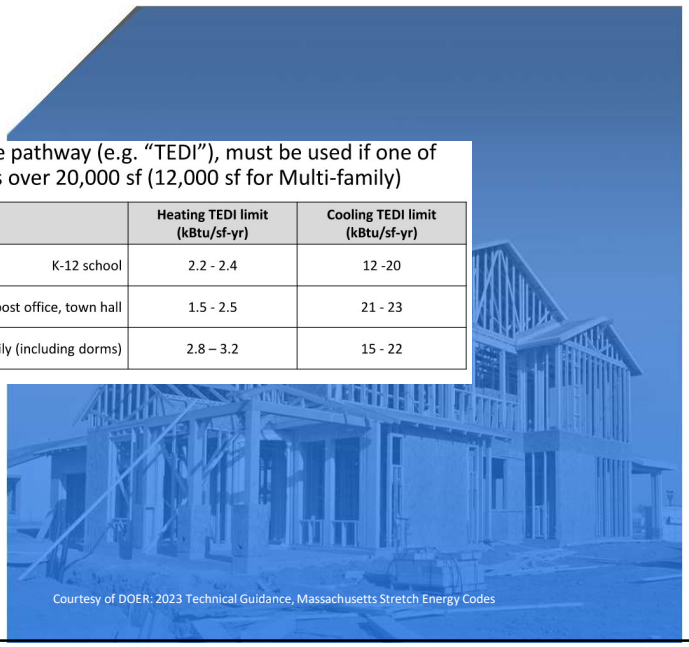
TEDI continued …

- "Targeted" performance pathway (e.g. "TEDI"), must be used if one of the building use types is over 20,000 sf (12,000 sf for Multi-family)

Building type	Heating TEDI limit (kBtu/sf-yr)	Cooling TEDI limit (kBtu/sf-yr)
K-12 school	2.2 - 2.4	12 -20
Office, fire & police station, library, post office, town hall	1.5 - 2.5	21 - 23
Multi-family (including dorms)	2.8 – 3.2	15 - 22

The same models currently used for stretch code compliance also produce TEDI information

IES EnergyPlus eQUEST



Courtesy of DOER: 2023 Technical Guidance, Massachusetts Stretch Energy Codes

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Poll Question # 5

TEDI refers to the building energy demand; EUI refers to the building energy consumption.

A. TRUE
B. FALSE

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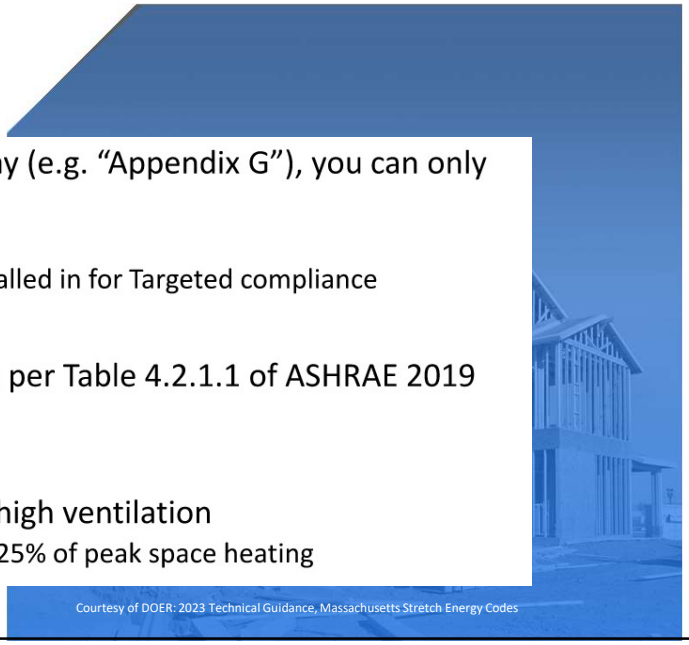
Relative Performance Pathway (ASHRAE 90.1 Appendix G)

- "Relative" performance pathway (e.g. "Appendix G"), you can only use if:
  - Highly ventilated (0.5 cfm/sf) OR
  - If not one of the building types called in for Targeted compliance
- Show site energy use reduction per Table 4.2.1.1 of ASHRAE 2019 Appendix G
- If following Appendix G due to high ventilation
  - Must have heat pumps sized for 25% of peak space heating



Courtesy of DOER: 2023 Technical Guidance, Massachusetts Stretch Energy Codes

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Multi-Family and Mixed-use Residential

Courtesy of DOER: 2023 Technical Guidance, Massachusetts Stretch Energy Codes

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Timeline: Stretch Code Update for Multi-family

Until June 30, 2023

- **9th Edition Stretch code**
- HERS 55-65
- Energy Star 3.1
- Phius+ 2018
- PHI Classic
- ASHRAE 90.1-2013 if 5+ stories

July 1, 2023

- **Stretch Commercial update**
- HERS 52/55/58
- TEDI
- Phius Core 2021
- PHI Classic
- ASHRAE 90.1-2019

July 1, 2024

- **Stretch Residential phase-in**
- HERS 42/45
- TEDI
- Phius Core 2021
- PHI Classic

Commercial Stretch updates July 1, 2023

ASHRAE & HERS changes on July 1, 2024

Courtesy of DOER: 2023 Technical Guidance, Massachusetts Stretch Energy Codes

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Passive House Building Certification Option

- Projects may document compliance with either PHIUS certification or PHI certification.
- Must use the most recent version of the software for the Passive House approach

PHIUS
Passive House Institute US

Passive House Institute

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Poll Question # 5

The project consists of a Dormitory, 35,000 sq. ft. of conditioned floor area. What is the appropriate compliance path?

A. Prescriptive
B. Targeting Performance
C. Relative Performance
D. ASHRAE 90.1, 2016 Appendix G

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Existing Buildings

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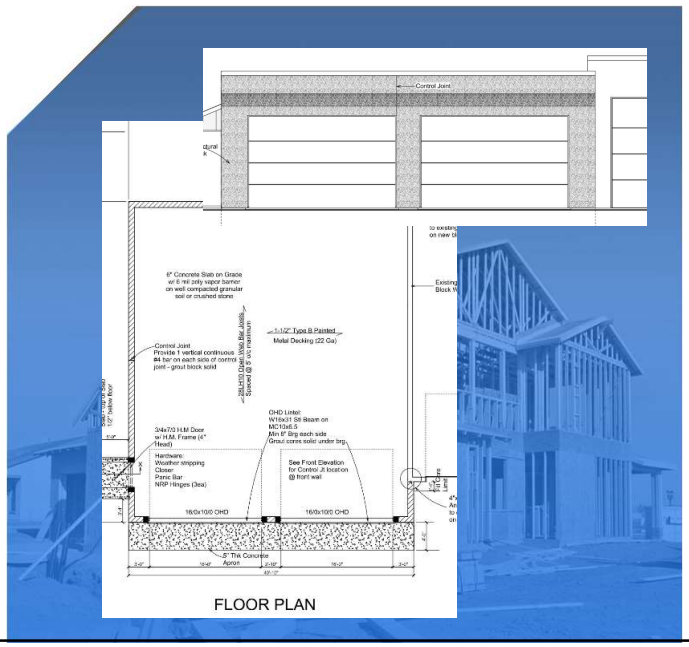
Existing Buildings – Chapter [CE] 5

Projects in existing buildings shall comply with:

- ✓ C502 – Additions
- ✓ C503 – Alterations
- ✓ C504 – Repairs
- ✓ C505 – Change of Occupancy or Use



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Additions C502.1

- <20,000sf and <100% of existing building – Prescriptive new construction
  - C401.3 Envelope Certificate
  - C402-406 Component Requirements
  - C408 Maintenance and Commissioning
- ≥20,000sf and 100% = new construction TEDI, ASHRAE

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Summary/Closing

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Commercial Overview Summary

- New commercial provisions offer opportunities to save energy and decarbonization
- Prescriptive R-values have been replaced by U-factors in determining compliance
- Target Performance pathway considers the energy demand when determining compliance
- Thermal bridging at walls is being addressed
- Additional mechanical systems efficiencies are part of the new code.
- COMcheck is still required for most compliance pathways
- Relative Performance compliance pathway is based on ASHRAE 90.1-2019, Appendix G

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Questions??

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Energy Code Support

Questions about the energy code?

Energy Code Support Hotline:

855-757-9717

Energy Code Support Email:

energycodesma@psdconsulting.com

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Thanks!

Massachusetts Energy Code Technical Support Program

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