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Energy Code Technical Support

Commercial Codes FAQs:

2015 International Energy Conservation Code (IECC) with MA Amendments & MA Stretch Energy Code

GENERAL

Q: When does/did the new code go into effect?

A: In accordance with the Green Communities Act of 2008, Massachusetts is required to update its building code every three years to be consistent with the most recent version of the International Energy Conservation Code (IECC).

MASSACHUSETTS ENERGY CODE TIMELINE

2016		2017		2018
Before Aug 12	Aug 12 - Jan 1 2017	Jan 2 - Oct 20	Oct 20 - Dec 31	Jan 1 and after
8th Edition				
	Revised 8th Edition			
			9th Edition	

On July 19, 2016, the Board of Building Regulations and Standards (BBRS) approved the adoption of 2015 IECC and certain Massachusetts-specific amendments as revisions to the 8th Edition of the code. The effective date of the new energy provisions in 780 CMR was August 12, 2016, with a concurrency period that ran through January 1, 2017.

Effective starting January 2, 2017, all commercial construction must comply with the 2015 IECC commercial provisions with Massachusetts Amendments or ASHRAE 90.1-2013.

On October 6, 2017, the BBRS approved the adoption of the 9th Edition of the code. The effective date was October 20, 2017, with a concurrency period through January 1, 2018, at which time the 9th Edition will be in full effect.

Q: What if I live in a municipality that has adopted the Stretch Code?

A: Newly constructed commercial buildings over 100,000 square feet and new supermarkets, laboratories and conditioned warehouses over 40,000 square feet located in municipalities designated as “Green Communities” or “Stretch Code Communities” need to comply with the provisions of Appendix AA: Stretch Energy Code (780 CMR 115.AA) in lieu of complying with the 2015 IECC.

Buildings	Stretch Code Compliance
Buildings over 100,000 square feet and new supermarkets, laboratories and conditioned warehouses over 40,000 square feet	10% below the energy requirements of ASHRAE 90.1-2013 Appendix G Performance Rating Method
Other new commercial buildings	No additional requirements

Stretch Code Update

When the State updated the base energy code to the 2015 IECC, the previously adopted Massachusetts Stretch Code was also updated. The updated Stretch Code, which emphasizes energy performance, as opposed to prescriptive requirements, is designed to result in cost-effective construction that is more energy efficient than that built to the “base” (2015 IECC) energy code. Large buildings (over 100,000 square feet) and certain high energy use buildings are required to demonstrate energy use per square foot of at least 10% below the energy requirements of ASHRAE 90.1-2013 Appendix G Performance Rating Method in order to comply with the Stretch Code. All other project types need to comply with the requirements of the base code. For qualifying projects located in designated “Green Communities” and “Stretch Code Communities”, the Stretch Code replaces the base code and is mandatory. For projects not located in these jurisdictions, the Stretch Code offers building owners and design teams of certain building types an alternative “above code” compliance path.

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SCOPE AND ADMINISTRATION

Q: What are the specific Massachusetts Amendments to the 2015 IECC?

A: Revisions to the 8th Edition of the Massachusetts building code include five significant amendments to the 2015 IECC:

1. Added subsection C401.2.2 that allows projects using the ASHRAE 90.1 Appendix G Performance Rating Method compliance path to determine the building energy consumption comparison based on site energy and/or on a source energy basis (see below for additional C406 requirements). This amendment also applies to projects complying with the Stretch Code.
2. Revised section C406.1 to require at least two of the additional efficiency package options (exception: only one option is required for buildings in areas not served by Mass Save incentive programs). This C406 requirement now also applies to projects following the ASHRAE 90.1-2013 compliance path.
3. Revised subsection C406.4 to allow for the limited use of select biomass fuel and the use of a geothermal heat pump for building space and servicing water heating.
4. Added subsection C407.6.1.1, which lists RESNET approved software for Home Energy Rating System (HERS), Passive House Institute (PHIUS) approved software and Energy Star Homes 3.1 as approved alternative energy performance methods.
5. Subsection C407.7.6.1.1 includes the Energy Rating Index (ERI) as an approved approach. This ERI approach allows limited renewable trade-offs to increase the allowable HERS Index Score.

Revisions to the 9th Edition of the code will go into full effect on January 2, 2018, and include the following additional amendments to the 2015 IECC:

1. Rooftop Solar Readiness (C402.3). This new requirement applies only to limited commercial building types based on their height, roof area, and compass orientation. It is fundamentally a set of documentation requirements that identify a "solar-ready zone" on the roof, note the roof's structural design loads, indicate pathways for future conduits or plumbing that would be connected to rooftop solar systems, and reserves a "Future Solar Ready" space in an electrical panel. This C402.3 does not require the installation of solar power in the building. Instead it is intended to make it easier for installation in the future if the building owner chooses to install such a system.
2. COMcheck Submittal (107.2.6). This code change is found in Chapter 1 of 780CMR, the Scope and Administration chapter that is unique to Massachusetts. Section 107 generally defines mandatory submittals, and 107.2 covers construction document submittals pertaining to fire protection systems, means of egress, and several others. New to this list is a requirement in 107.2.6 that the permit application for commercial buildings must include a completed COMcheck compliance certificate for envelope, lighting and mechanical systems, along with a Plan Review Inspection Checklist. This requirement for COMcheck documentation applies regardless of which compliance path is being used. Remember that COMcheck can generate these documents for both IECC or ASHRAE compliance paths.

Q: What other compliance paths are there besides the prescriptive path?

A: The option to follow the performance path is available by utilizing the “Energy Cost Budget” (ECB) methodology detailed in ASHRAE Standard 90.1-2013 and the Massachusetts Amendments (780 CMR). If choosing that path, all code requirements identified as “mandatory” in Chapter 4 of the energy code must be complied with in addition to meeting the performance requirements. It is recommended that projects use the ECB approach as defined in ASHRAE Standard 90.1-2013 and not the performance provisions in the 2015 IECC.

Projects wishing to exceed the base code requirements can use the ASHRAE 90.1-2013 Appendix G performance rating method to comply with the energy code. This method is mandatory for certain building types needing to comply with the Stretch Code.

Additionally, the building official can, at their option, allow the written approval of a building for an “above code program” to be submitted as evidence of energy code compliance. The code official must approve this compliance path in advance.

EXISTING BUILDINGS

Q: Does the energy code apply to existing buildings?

A: Yes, but only when an alteration, addition or change of use is executed.

Q: Where are the requirements for existing buildings?

A: The 2015 IECC created a new chapter for Existing Buildings – Chapter 5.

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Q: Are Historic Buildings required to comply with the energy code?

A: Historic Buildings can be exempt from the requirements of the energy code provided a report has been submitted to the code official demonstrating that compliance would degrade or destroy the historic form, fabric or function of the building. The report must be signed by a registered design professional or a representative of the State Historic Preservation Office.

Q: What determines if an alteration needs to meet the energy code?

A: The code states that alterations to existing buildings or building systems must comply "as they relate to new construction". This is interpreted to mean that if the alteration includes changes that are covered by the code for new construction, the code provisions must be met for the alteration. There are several exceptions (based on the condition that the energy use for the building is not increased), where compliance with the energy code is not required, including:

- Installing storm windows over existing windows
- Surface-applied window film installed on existing single-pane fenestration assemblies reducing solar heat gain
- Existing wall, floor, or ceiling cavities exposed during construction, if filled with insulation
- Existing wall, floor, or ceiling cavities not exposed during construction
- Roof recover where an additional roof covering is installed over an existing roof covering.
- Air barriers are not required for roof recover and roof replacements where alterations, renovations or repairs are not made to the remainder of the building envelope
- Alterations that replace less than either 10% or 50% of luminaires (light fixtures) in the space, depending on which section of Section C503 applies, provided the installed lighting power is not increased

Q: How do I determine if a building repair needs to meet the energy code?

A: The repair of an existing building for the purpose of its maintenance or to correct damage is not subject to the "alterations" requirements in the existing buildings chapter. The code considers the following as repairs:

- Glass-only replacements in an existing sash and frame
- Roof repairs as defined by the code
- Air barriers are not required for roof repair where the repairs to the building do not include alterations, renovations or repairs to the remainder of the building envelope
- Replacement of existing doors that separate conditioned space from the exterior does not trigger the installation of a vestibule or revolving door
- Repairs where only the bulb, the ballast or both within the existing luminaires in a space are replaced, provided that the replacement does not increase the installed interior lighting power.

Q: When does a change in occupancy or use require compliance with the energy code?

A: If a change in occupancy or use will result in an increase in demand for electricity or fossil fuel, the project must comply with energy code provisions. In addition, a change in use requires that the lighting power requirements for the new space type be met.

ENVELOPE

Q: I noticed that there are U-factor tables and R-value tables. What is the difference?

A: U-factor is the amount of heat that flows through one square foot of an assembly in one hour when there is a 1°F temperature difference across the surface. A smaller U-factor for the assembly indicates there is less heat flow through the envelope. R-value is the inverse of U-factor and therefore measures the resistance to heat flow. The U-factors in the code tables list the maximum allowable values for the entire opaque envelope assembly indicated. The R-value tables list the minimum values for the different cavity insulation materials that typically are combined to make the opaque envelope assembly indicated. Code compliance is demonstrated by meeting either U-factor or R-value requirement.

Q: Are there pre-calculated values for insulation assemblies that can be used to meet the code?

A: Appendix A of ASHRAE Standard 90.1-2013 includes pre-calculated insulation performance levels for particular assemblies that can be used as an alternative to the R-values listed in table C402.1.3.

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Q: What are C-factors and F-factors? When are these factors applicable?

A: These factors are alternatives to using insulation R-values for below grade walls (C-factor) and slabs (F-factor). Both factors are pre-calculated insulation performance levels for particular assemblies. The assemblies are described and provided with default C or F-factors in Appendix A of ASHRAE Standard 90.1-2013. These default values can only be utilized for the specific assemblies specifically listed in Appendix A of ASHRAE 90.1-2013. Otherwise, values listed in C402.1.3 should be utilized for below grade walls and slabs.

Q: What exactly is meant by continuous insulation?

A: It is a layer of insulation that is not "broken" by the framing. It is typically rigid or semi-rigid insulation foam board installed on the inside or outside of the assembly cavity.

Q: Can Z-girts be installed in continuous insulation to support the cladding?

A: No. Continuous insulation (CI) should be continuous across all structural members without thermal bridges, other than fasteners and service openings. CI should be penetrated only by intermittent clips and fasteners, with the cladding support framing to the exterior of the CI. Analysis has shown that with z-furring interrupting CI, there is a drop in energy efficiency of greater than 50% and the likelihood of condensation within the wall cavity increases substantially.

Q: I am working on a metal building and am not sure what the liner system (LS) requirement is.

A: Metal buildings using the R-value compliance are required to include a continuous liner system below the purlins and shall not be interrupted by framing members. This liner system provides a vapor barrier between the metal structural elements and the conditioned interior space. Additionally, a thermal spacer block is required between the metal purlins and roofing material.

Q: Is it possible to increase the cavity insulation and avoid installing continuous insulation?

A: No, wherever continuous insulation is mandated, it must be installed regardless of the R-value of the cavity insulation.

Q: What is needed to meet the requirements for a continuous air barrier?

A: A continuous air barrier must be installed to seal the building envelope assemblies from air leakage. It must connect all of the components of the envelope, and it must meet the specifications listed in section C402.5.1 of the code.

Q: Can the air barrier be installed outside the sheathing?

A: It is most commonly installed outside the sheathing, but may be placed inside, outside, or within envelope assemblies.

Q: What is the difference between air barriers and vapor barriers or retarders?

A: Vapor barriers and retarders are designed to prevent vapor from entering envelope assemblies through diffusion. The air barrier is intended to stop air leakage. Some air barriers serve as both air and vapor barriers.

Q: What are the requirements for vapor barriers or retarders in the code?

A: Vapor barriers are no longer required as building scientists have determined that if envelope assemblies are properly sealed against air leakage, separate vapor retarders are not necessary. This does not mean that you cannot use vapor retarders, only that they are not required in the code.

Q: Doesn't a well-sealed building result in poor indoor air quality (IAQ) for building occupants and are there alternative compliance paths for meeting the air sealing requirements in the code?

A: As an alternative to meeting all of the air sealing requirements, a blower door test shall be conducted to demonstrate air tightness performance. But in order to pass the blower door test, the building will need to be sealed in similar fashion to the prescriptive air sealing requirements. Many studies show that sealing buildings from uncontrolled air leakage and introducing controlled ventilation results in better energy performance and improved indoor air quality.

Q: The allowable percentage of glass is limited to 30% of the opaque wall area. We often feature more installed glass in our projects – what compliance options do we have?

A: There are two options available in Massachusetts which allow for a larger percentage of glazed area. The maximum area may be increased to 40% of the wall area if the project meets the daylight requirements of C402.4.1.1 which, for buildings 2 stories or less, requires that 50% of the net floor area be within a daylight zone and for building 3 stories or more, 25% of the net floor area be within a daylight zone. The daylight zone also must have automatic lighting controls.

The other option is to utilize ASHRAE/IESNA Standard 90.1-2013 for code compliance, utilizing the "Energy Cost Budget" methodology or Appendix G. With this methodology, there are no restrictions for the amount of glazed area, as the total building performance is determined through a modeling procedure.

Q: If one of the envelope assemblies we wish to use does not meet the R-value or U-factor requirement listed in the tables, can a tradeoff be made with other assemblies that are designed to perform better than the code requires?

A: Yes, some tradeoffs are allowable within the envelope provisions. But it is best to discuss such tradeoffs with a local code official prior to construction, to make sure that the tradeoff is allowable. Although the tradeoff calculation can be done manually, COMcheck automatically performs tradeoff calculations as the envelope section is completed.

Q: Why are some envelope provisions termed "mandatory" and others are not?

A: The term mandatory means that the provisions cannot be "traded-off" with other envelope provisions, and that it still must be complied with when utilizing the ASHRAE 90.1-2013 Energy Cost Budget or Appendix G compliance methodology.

Q: Can lighting or mechanical systems provide tradeoffs with envelope performance?

A: No, envelope assemblies and components can only be traded off with other envelope assemblies and components.

Q: How does the code give credit for reducing solar gains by providing shading?

A: The code allows design teams to determine the projection factor of an overhang (A/B in Figure 1) and adjust the Solar Heat Gain Coefficient (SHGC) of the glazing that is being shaded based on the projection factor.

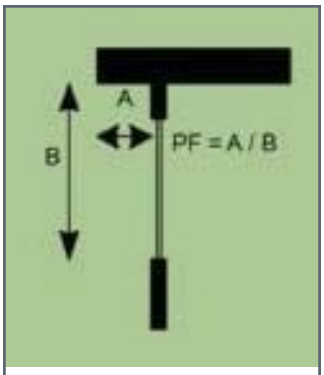

Figure 1: Projection Factor Calculation

Q: Are the U-factors in the fenestration tables for center-of-glass?

A: No. The U-factors in the code apply to the whole window unit including glazing, frame and spacers in accordance with the rating methodology put forth by the National Fenestration Rating Council (NFRC).

Q: What occurs if the fenestration that is being specified for a project is not NFRC rated or needs to be site-built or assembled?

A: There are three options to receiving an NFRC rating:

1. Provide the test and simulation for the specified products o n a project
2. Review the Certified Products Directory and request a specific certified product from the supplier or contractor
   a. Inform the code official what certified system will be used
   b. Code official then obtains all pertinent data and issues a label certificate to the contractor or architect
3. Request that a supplier provide a test and simulation report for a product to an accredited lab in accordance with NFRC 100

Q: When do the default tables for fenestration performance apply?

A: These tables are utilized when the factory applied performance label is not attached to the window or door. The default tables are conservative, so it is best (and is a code requirement) to retain the rating labels until the code official has viewed them.

Q: Some provisions limit total skylight area while other provisions require skylight installation. This is confusing. Can you provide some guidance?

A: In most cases, both of the following will apply:

- The maximum total skylight area may not exceed 3% of the roof area
  - However, the allowable skylight area increases to 5% of the gross roof area if automatic daylight controls are utilized in the space where the skylights are installed

- Minimum skylight area with automatic daylight controls is required for all of the following spaces:
  - Enclosed spaces with floor area greater than 2,500 square feet, directly under a roof with no less than 75% of the ceiling area with a height greater than 15 ft., and fall under the following use categories:

Office	Corridor	Automotive Service	Distribution/Sorting Area
Lobby	Storage space	Manufacturing	Transportation depot
Atrium	Gymnasium/Exercise Center	Non-refrigerated Warehouse	Workshop
Concourse	Convention Center	Retail Store	

  - For these spaces, the total daylight zone under skylights is required to be not less than 50% of the floor area and needs to provide one of the following:
    - The skylight area must be at least 3% where all skylights have a visible transmittance (VT) of at least 0.40
    - There must be a minimum skylight effective aperture of at least 1%

Q: The energy code now requires skylights for some spaces. What is the relative electrical lighting savings compared to the heat loss through the skylights?

A: The code requirements for skylights and daylighting were developed to produce large enough electrical lighting savings to offset any associated heat loss. Analysis of these savings is available from Pacific Northwest National Lab at: https://www.energycodes.gov/sites/default/files/documents/PNNL-22760.pdf

The New Building Institute (NBI) has developed a series of daylighting pattern guides that can be helpful when meeting the code requirements. They are available at: http://patternguide.advancedbuildings.net/

Q: Are there any financial incentives available for energy efficient construction?

A: Yes. The Mass Save® program, which is sponsored by the gas and electric Program Administrators in the state, offers a variety of energy efficiency incentives for commercial buildings. Information is available at: www.masssave.com/en/saving/business-rebates

LIGHTING

Q: What types of lamps and light fixtures meet the code requirements for interior lighting?

A: The energy code allows flexibility for lamp and light fixture choices. Compliance is determined by the installed lighting wattage, per floor area, for a space type, or a building type. The resulting calculation of installed watts/ square feet is termed “lighting power density (LPD)”. The maximum installed wattage allowed by code for a space or building type i s termed the “lighting power allowance (LPA)”. A n exception to this code relates to residential spaces within commercial buildings. For these spaces, commercial lighting requirements are waived if 75% of the permanently installed lighting fixtures contain only “high efficacy” lamps.

Q: What is the definition of “high efficacy” lamps?

A: The energy code defines high efficacy lamps a s T 8 or smaller diameter fluorescent lamps, or lamps that meet the following efficacy levels:

1. 60 lumens per watt for lamps over 40 watts
2. 50 lumens per watt for lamps between 15 and 40 watts
3. 40 lumens per watt for lamps 15 watts or less

In practice T5, T8, compact fluorescent (CFL) and Light Emitting Diode (LED) lamps meet these efficacy levels.

Q: Why is the term efficacy used? Isn’t it the same as “efficiency?”

A: Efficacy is the efficiency of the lamp in producing light in lumens per watt. Efficiency is typically used for the purpose of describing the ability of the lamp, ballast and fixture to deliver light to the desired area for a reduced number of total kWh in a space.

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Q: How do I calculate the LPD for a given space?

A: It is an easy calculation involving 3 steps:

1. Determine the rated wattage for each light fixture to be installed in the space
2. Total the rated wattage
3. Divide that total by the floor area in square feet to obtain the LPD

Q: Does COMcheck calculate the rated fixture watts when the lamp and ballast data is entered?

A: No, you must determine the rated fixture watts and enter it in the tool. Note that COMcheck does not prove compliance; it i s simply a calculation tool and i n order to demonstrate compliance you need to enter the maximum socket wattage for any screw-in lamp.

Q: How do I determine the rated fixture wattage?

A: It depends on the lamp type, as follows:

- Linear Fluorescent and High Intensity Discharge (HID): It is the rated wattage for the ballast when powering the specified lamps. This can be found on the ballast specification sheet (cut sheet) or is often listed on the fixture cut sheet for a given lamp/ballast combination. The rated wattage may be higher or lower than the sum of the lamp nominal wattages.
- Compact fluorescent lamps (CFL): For one piece CFLs using a bayonet (G2) socket, it is the listed wattage. For two-piece CFLs, it is determined the same way as linear fluorescent. A commonly accepted rated wattage for two-piece CFLs is the nominal lamp wattage plus 2 watts for the ballast.
- Incandescent, screw-in CFLs, and screw-in LEDs: The rated wattage is the maximum rated wattage of the socket.
- Hardwired LEDs: It is the LED plus the driver wattage. This is typically available on the specification sheet.

Q: How do I choose whether to use the "space-by-space" or "building area" lighting power method for a project?

A: In most cases, it is simpler to use the building area method as it allows similar contiguous areas to be calculated as one area. It also allows many of the areas specified in the space-by-space method to be included in larger general areas. For example, hallways, closets, mechanical rooms, etc. can all be included with general areas, such as "office" in the building area method. In addition, if choosing "reduced lighting power" as the section C406 "Additional Efficiency Package" option, the building area method must b e used.

Q: It appears that the standard automatic on/off occupancy sensors no longer meet the code for private offices, conference rooms, classrooms and other enclosed spaces. Is that correct?

A: They can still be used to meet the requirements for these types of spaces, but only if they automatically turn on 50% or less of the lighting-up occupancy and incorporate a manual control to allow occupants to turn lights off.

Manual on/auto-off occupancy sensors, often termed vacancy sensors, are one method of meeting this requirement. They are available for controlling single and dual circuits. A 2-circuit vacancy sensor facilitates compliance with both the occupancy and 50% light reduction requirements.

Q: For what types of spaces should manual-on occupancy sensors (vacancy sensors) be installed, and where should standard automatic on/off occupancy sensors be installed?

A: Manual-on vacancy sensors should be installed in enclosed spaces where there is sufficient ambient light (daylight or light from other spaces) to allow the lighting to remain off during some occupied periods. Private offices, conference rooms, and classrooms are typically good candidates for vacancy sensors, especially if there are windows or skylights in the space. Automatic on/off occupancy sensors work best in larger open spaces such as open office areas, lobbies, etc.

Q: Does all interior lighting now need to be controlled by a timer?

A: Each area of a building that is not provided with occupant sensor controls shall be provided with time switch controls.

Q: Where do I need to install daylighting controls?

A: The code requires that areas under skylights and areas adjacent to vertical fenestrations with more than 150 watts must have daylight-responsive controls to control electric lights within those zones. Lights in top light daylight zones must be controlled independently of lights in sidelight daylight zones, and lights in sidelight daylight zones facing different cardinal orientations (i.e. within 45 degrees of due north, east, south, west) must be controlled independently of each other. The daylight responsive controls must be capable of a complete shutoff of all controlled lights.

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Q: How does the code define "daylight zones"?

A: Daylight zones are determined based on the location of fenestration in a wall, a rooftop monitor or skylight in relation to floor to ceiling partitions.

- For vertical windows, daylight zones depth ends at the nearest full- height wall or up to 1.0 times the height from the floor to the top of the fenestration (H in Figure 2). The daylight zone width extends to the nearest full-height wall or up to 2 feet, whichever is less.
- Where vertical fenestration is located in a rooftop monitor, the daylight zone extends laterally to the nearest partition that is taller than 0.7 times the ceiling height or up to 1.0 times the height from the floor to the bottom of the fenestration, whichever is less. The width extends to the nearest partition that is taller than 0.7 times the ceiling height or up to 0.25 times the height to the bottom of the fenestration, whichever is less (as shown in Figure 3).

For skylights, daylight zones extend in each direction to the nearest partition that is taller than 0.7 times the ceiling height or up to 0.7 times the floor-to-ceiling height, whichever is least.

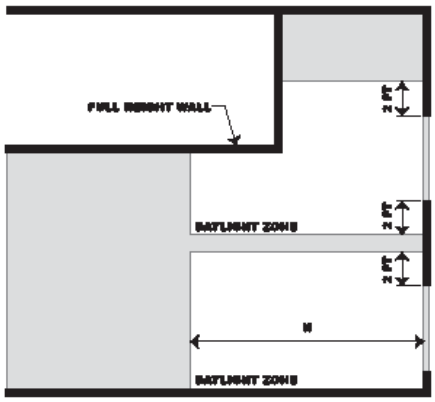

Figure 2:
Plan view of daylight area calculation methodology.

Q: What are the functional testing requirements for the lighting control systems and who is the responsible party?

A: It is required that installed occupant sensor controls, time switch controls, and daylight responsive controls pass functional testing prior to passing final inspection. For occupant sensor controls this includes:

- The sensor has been located and aimed in accordance with manufacturer recommendations
- Individual sensor testing for projects with seven or fewer sensors
- For projects with seven or more sensors, testing must be done for each unique combination of sensor type and space geometry

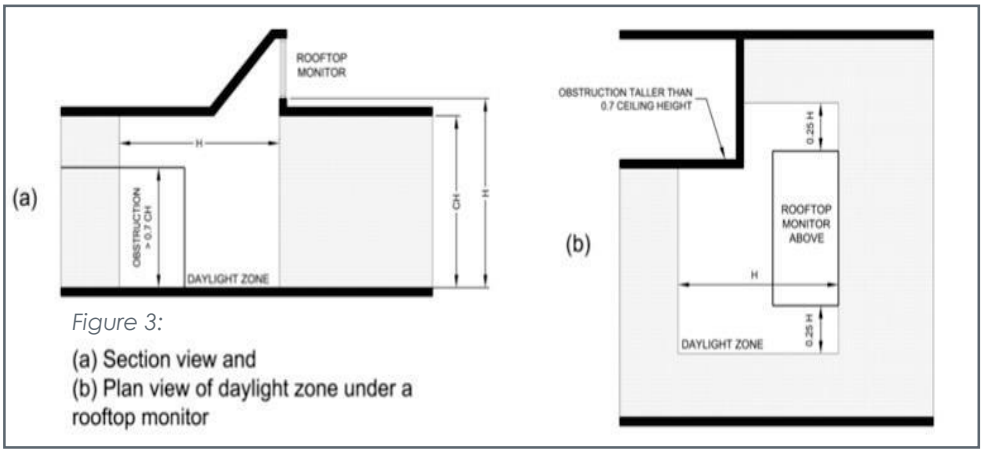

Figure 3:
(a) Section view and
(b) Plan view of daylight zone under a rooftop monitor

For time-switch controls, functional testing includes:

- Confirmation that controls have been accurately programmed for weekday, weekend and holiday schedules
- Provide programming documentation to the owner
- Verification of correct time and date, battery backup, and that the override time limit does not exceed 2 hours
- Simulate, verify and document proper operation for occupied and unoccupied conditions

For daylight responsive controls, testing includes:

- Devices have been properly located, field calibrated and set for accurate set points and threshold light levels
- Daylight controlled light loads adjust to light level set points in response to available daylight
- The location of calibration adjustment equipment is readily accessible to only authorized personnel

The registered design professional needs to provide evidence to the code official that the lighting control systems have been tested such that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's instructions.

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Q: Is the procedure for meeting the outdoor lighting power provisions the same as for interior lighting power?

A: Exterior lighting requirements are based on watts per linear foot or the rated watts per area in square feet. Section C405.5.1 of the code provides guidelines for establishing "exterior lighting zones" based on the location of the project (rural, residential or high- activity commercial districts). The maximum values for each outdoor area by zone are listed in table C405.5.2 (2).

Q: Do the exterior lighting power provisions of the code mean that lighting must be provided in the listed zones?

A: No, the provisions simply restrict outdoor lighting to the indicated values. Decisions regarding whether or not to install exterior lighting, and to what level (up to the code maximum) are outside the scope of the energy code.

Q: Are there any financial incentives available for installing efficient lighting?

A: Yes. The Mass Save® program, which is sponsored by the gas and electric Program Administrators in the state, offers a variety of energy efficiency incentives for commercial buildings. Information is available at: www.masssave.com/en/saving/business-rebates

HVAC SYSTEMS

Q: Can any "rules of thumb" be used in load calculation and/or with sizing a mechanical system?

A: "Rules of thumb" cannot be used as the basis for system sizing. In addition, 'fudge factor' upsizing, or putting some extra capacity into a heating or cooling system, is not permitted by the code. Heating and cooling loads must be determined according to C403.2.1, while using an acceptable method such as ANSI/ASHRAE/ACCA Standard 183. The equipment must be selected to match the load or be consistent with the next commercially available size option. Proper load calculation and sizing will reduce energy consumption and maximize operating system efficiency.

Q: There are several equipment efficiency ratings that can be found for different types of HVAC systems. Which should be utilized in the design process?

A: Different types of heating and cooling equipment are commonly characterized by a single type of efficiency rating. For example, rooftop cooling systems are characterized by EER. Efficiencies for any planned piece of equipment must meet the minimum efficiencies shown in Tables C403.2.3 (1) through C403.2.3 (10). If values are not supplied for a piece of equipment, or if it is comprised of several components (small air handler and field-attached heating coil), the designer must be able to provide calculations to demonstrate that the overall system meets the required rating. Further when using the equipment manufacture's rating, it is important to use ratings that encompass an entire system (for example: to capture the overall efficiency of a DX split- system). Additionally, for chillers that have variable speed drives for optimized part-load condition operation, proper calculated part-load efficiencies must meet the part-load specifications in the tables.

Q: In the 2015 IECC commercial code, in Table C403.2.3(2) regarding electrically operated unitary and applied heat pumps, the minimum efficiency requirements for air cooled equipment has both an EER and IEER rating listed. Most manufacturers apparently only list one of these and not both. How is this handled in terms of meeting the code?

A: If a manufacturer cannot provide a Published Rating that includes both EER and IEER performance as required by ANSI/AHRI Standard 340/360 then their equipment does not meet the minimum requirements of the 2015 IECC.

Air-cooled unitary and heat pump equipment must comply with the ANSI/AHRI Standard 340/360-2015 test procedures. Section 7 of the Standard clearly states the minimum criteria for Published Ratings of equipment. For both unitary and heat pump equipment this includes both EER and IEER ratings. The test procedure can be found at the following URL: www.ahrinet.org/App_Content/ahri/files/STANDARDS/AHRI/AHRI_Standard_340-360_2015.pdf

Q: I want to use a combination boiler that provides both domestic hot water and space heat for the air handling system within an apartment complex. How does the efficiency rating system account for this?

A: A boiler system providing both domestic hot water and hot water to the air handler needs to meet the efficiency requirement of each separate system.

Q: If a facility runs 24 hours per day for a 5-day week, is a temperature setback control required?

A: Yes. The code mandates that the installed temperature control be capable of automatically scheduling space temperatures for each day of the week independently. This will enable temperature adjustment for occupied and unoccupied periods of the week. The exception would be if the building (or particular areas) consumed less than 2 kW at full load, and had an accessible manual OFF switch.

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Q: Can a single thermostat be used for contiguous spaces, such as a full floor of office cubicles?

A: There must be at least one thermostatic control for each zone in the building, where the zone characterizes a space with unique heating and cooling requirements. Therefore, if the entire floor in this example represents a single zone, only one thermostat is required. However, if there are different heating and cooling requirements (representing multiple zones), then multiple thermostats are required. In such a case, use of a single control point would be inefficient.

Q: If I am not using a direct digital control (DDC) system, do I need to worry about a deadband between heating and cooling?

A: Yes, C403.2.4.1.2 requires a 5°F separation of heating functions to prevent short cycling between heating and cooling. Most programmable automatic changeover thermostats have this function.

Q: We are installing an Energy Management System (EMS) in our project. Will this type of system meet the HVAC control requirements in the code?

A: Yes. EMS systems will typically include the capability to meet all of the control requirements in the code for HVAC as well as lighting systems. However, the EMS system must be calibrated to ensure that it is meeting the minimum requirements in the code. This process is covered by the commissioning requirements.

Q: Do installed mechanical systems need to be commissioned?

A: Yes. According to C403.2.11, installed mechanical systems sized at or above the commissioning threshold shall be commissioned prior to the final mechanical inspection according to C408.2 in order to verify that the systems operate according to their design intent. The requirements include:

Submitting a commissioning plan with the building plans that covers:

- System adjusting and balancing
- Functional performance testing of:
  - Equipment
  - Controls
  - Economizer

A preliminary commissioning report must be submitted to the building owner prior to the final commissioning report.

Q: Are automatic control dampers required on all duct connections to the buildings' exterior?

A: No. Gravity or back-draft dampers can be used in buildings with less than three (3) stories because the stack effect in shorter buildings is less pronounced. Gravity dampers can also be used in smaller exhaust fans, less than 300 cfm. The requirement in the 2015 IECC varies from ASHRAE 90.1 2013, which requires motorized dampers for ventilation air intakes in buildings less than 3 stories.

Q. Why are there no specific references for simple and complex systems in the 2015 IECC?

A: The previous version of the code distinguished between "simple" and "complex" mechanical systems based on the type of equipment being used and how zones were configured and controlled. The updated code no longer uses this terminology but provides a set of prescriptive requirements for hydronic and multiple-zone HVAC systems controls and equipment (C403.4). Additionally, there is a discrete set of requirements for complex mechanical systems serving multiple zones (C403.4.4) that generally addresses variable air volume (VAV) systems and ensures that they are capable of reducing primary air supply to each zone.

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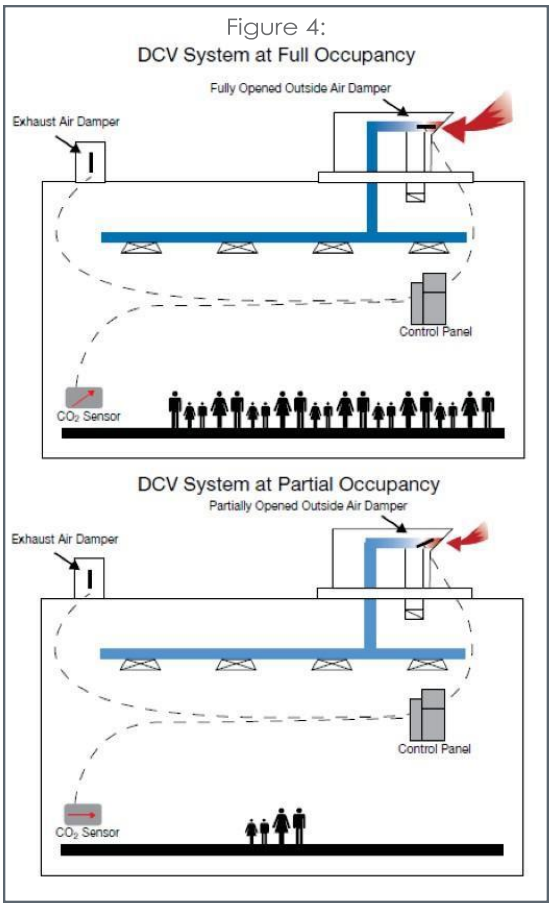
Q: What is demand control ventilation (DCV)? Is it always required?

A: Demand control ventilation (see figure 4) is a specialized ventilation control system that is intended for spaces that experience highly variable occupancy patterns (cafeterias, auditoriums, etc.). The approach with DCV is to modulate (reduce) the amount of outside air and supply air to a space as CO2 levels fluctuate due to varying occupancy levels, thereby reducing fan and heating/ cooling energy. DCV is not required for all spaces. Only spaces that exceed a specified number of occupants per square foot and a certain rate of outside air flow need to have such a system. Spaces with certain specialty applications, i.e. ventilation provided for process loads are an exception to this requirement.



Q: What is Energy Recovery Ventilation? When is it required?

A: Energy recovery ventilation (ERV) reduces energy use associated with ventilation requirements by recapturing waste energy in the exhaust air flow. Whether this type of system is required depends upon the percent of outdoor air being supplied, and the supply airflow rate (CFM) a s specified in Tables C403.2.7(1) and C403.2.7(2).

Q: I am designing a laboratory area. Do I need to use an energy recovery unit?

A: Not necessarily. ERV is not required if the fume hoods in the space utilize a variable volume control where the make-up and exhaust volumes can be turned down by 50%, or if direct make-up air accounts for at least 75% of the exhaust rate with limited tempering. Otherwise, ERV is required.

Q: Does ductwork in a conditioned space need to be insulated?

A: Ductwork running in a conditioned space only needs to be insulated if the temperature difference between the air in the duct (any duct) and the space temperature is greater than 15°F.

Q: Is ductwork required to be pressure tested?

A: Ductwork does not need to be pressure tested unless it will run at over 3" w.c. in which case it is considered to be a high pressure duct system and will need to be tested.

Q: Does a small rooftop AC unit require fault detection and diagnostics (FDD) functionality for economizers?

A: Yes. All air-cooled unitary direct-expansion units listed in Tables C403.2.3(1) through C403.2.3(3) and variable refrigerant flow (VRF) units that are equipped with an economizer need to include a FDD system capable of indicating system status and detecting the following faults:

- Air temperature sensor failure/fault
- Not economizing when the unit should be economizing
- Economizing when the unit should not be economizing
- Damper not modulating
- Excess outdoor air

Q: What are the functional testing or commissioning requirements for economizers?

A: Section C408.2.3.3 requires functional testing of economizers to ensure that they operate in accordance with manufacturers' specifications.

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Q: When are variable speed drives required on variable air volume (VAV) supply fans?

A: According to C403.4.1, the code states that when the mechanical cooling capacity f or any direct expansion (DX) unit is 65,000 Bth/h or greater, it shall vary the indoor fan airflow as a function of load. This is most commonly done with a variable frequency drive (VFD).

Q. What are the new section C406.1 requirements for more efficient HVAC equipment?

A: The updated code removes a second set of HVAC tables from the code, and simply states that more efficient HVAC equipment needs to exceed the minimum efficiency requirements listed in the code by 10%.

Q: I don't recall seeing the Dedicated Outdoor Air System (DOAS) C406.1 option in the previous version of the code - what is this option all about?

A: Using an independent ventilation system to provide outside air instead o f a packaged system can provide several benefits to building occupants and owners, such as being a more efficient way to meet minimum ventilation requirements and improving indoor air quality.

Q: Is a snowmelt system possible within the energy code?

A: Yes. These systems are required to include automatic controls capable of shutting off the system when the pavement temperature is above 50°F, no precipitation is falling, and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F.

Q: Are there any financial incentives available for installing efficient HVAC?

A: Yes. The Mass Save® program, which is sponsored by the gas and electric Program Administrators in the state, offers a variety of energy efficiency incentives for commercial buildings. Information is available at: www.masssave.com/en/saving/business-rebates

SERVICE HOT WATER

Q. What are the requirements associated with efficient heated water supply piping as I don't recall seeing this in the previous version of the code?

A: This is a n entirely new requirement i n the 2015 IECC where there are two options for compliance. One option is the maximum pipe length method which limits the length of pipe from the nearest source of heater water to the fixture. The second option sets limits based on pipe volume (liquid ounces per foot length). The intent here is to increase the efficiency of the system by limiting wasted hot water due to pipe runs between the hot water source and the supply fixture.

Q: What are the pipe insulation requirements for circulating hot water?

A: Pipe insulation needs to meet the requirements of table C403.2.10 and needs to be continuous.

Q. What controls are required for circulating hot water systems?

A: The controls for circulating hot water systems pumps shall start the pump based on demand for hot water and shall be capable of automatically turning off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

Q: The water heating equipment we specified does not have heat traps. Do they need to be included?

A: Yes. If the water heating equipment specified for a non-circulating system does not include integral heat traps, they need to be installed on the supply and discharge piping.

Q: What are the new functional testing requirements for service water heating systems?

A: Service water heating equipment needs to be functionally tested to ensure proper installation and operation. Additionally, service water heating control systems need to be tested and adjusted to ensure that they are functioning in accordance with approved plans and specifications.

Q: What are the section 406.1 requirements for more efficient hot water systems?

A: Select buildings with large hot water demand are eligible for selecting the reduced energy use in service water heating package option which requires that waste heat recovery or solar water heating systems supply at least 60% of the buildings hot water needs.