

Massachusetts Energy Code Update

Effective July 1, 2010

Back in 2008 the State approved the Green Communities Act, which mandated our adoption of the International Energy Conservation Code to go into effect January 1, 2010. It provides a 180-day transition period (which we are currently under) before becoming the required standard. The new code becomes mandatory July 1, 2010. The new code is the 2009 edition of the International Code Council's (ICC) 2009 "International Energy Conservation Code," together with Massachusetts addendums as outline in Section 61.00 of the Building Code.

There is actually little change in the technical portion of the code, but the way we go about "proving compliance" has changed significantly. I would like to review some of the important changes.

Code Applicability

This code is applicable to the following:

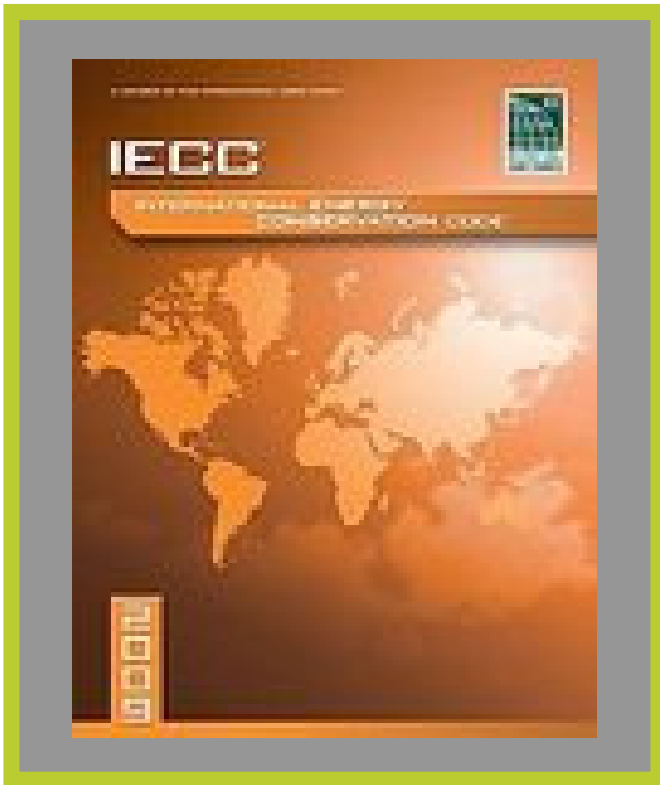
- new residential construction up to 3 stories
- additions
- renovations

Exceptions:

- small (less than 100 s.f. buildings) or unconditioned buildings
- agricultural buildings
- historical buildings
- low energy use buildings
 - *less than 1 watt or 3.4 btu/h per square foot peak energy use

Methods of Energy Design

When it comes to building design we have two methods we can use for determining compliance, Prescription Requirements and Simulated Performance. Prescriptive means if we meet the requirements of Table 402.1.1 then we comply. The second method uses computer simulation to determine if the specific design is in compliance with the energy code. This uses REScheck or similar computer software to determine compliance.



2009 International Energy Conservation Code by the International Code Council

The technical portion basically remains the same, but now we can not just say we did the work in conformance with the code, we must demonstrate compliance with it either by Visual Inspection Checklist or Mechanical Testing.

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Prescriptive Code

Prescriptive is a simple and effective way of ensuring compliance with the energy code. Do what the code says and you've met the requirements. Sometimes it's the only way to meet the code when dealing with a large percent of glazing. The downside is you do not get any trade offs for high efficiency HVAC equipment.

To the right is Table 402.1.1 of the 2009 IECC. Massachusetts is located in Climate Zone 5 and Marine 4.

If your assemblies and glazing meet the values set in the table then you comply with the design requirements as it relates to the code.

Prescriptive Change

You may notice in Table 402.1.1 there has been a change to the prescriptive requirement for wall insulation. It has been increased to **R-20**. You may say, "Now wait a minute, there's no R-20 insulation!" This is true, the only way to get R-20 is for a spray foam or cellulose product. If using fiberglass you will need to use R-21 high density. This change was made due to the fact that R-19 fiberglass insulation was for floor joists (2x8) and when used in a 2x6 wall would cause the insulation to be compressed, only providing at most R-16.7.

You may think this eliminates 2x4 construction, but you do have two options for complying with the energy code and using 2x4 studs:

1. closed cell spray foam insulation which provides around R-7 per inch. This would provide R-24.
2. If you notice in Table 402.1.1 under Wood Frame Wall Value you will see R-20 or 13 + 5. You are allowed to use R-13 fiberglass batt insulation with rigid insulation having a R-5 value applied to the exterior side of the stud wall. Even though this only adds up to R-18, the continuous application of R-5 rigid provides more value than just the R-5 value of the insulation.

TABLE 402.1.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT*

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b,c}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ^e	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^e WALL R-VALUE
1	1.2	0.75	0.30	30	13	3/4	13	0	0	0
2	0.65 ^f	0.75	0.30	30	13	4/6	13	0	0	0
3	0.50 ^f	0.65	0.30	30	13	5/8	19	5/13 ^g	0	5/13
4 except Marine	0.35	0.60	NR	38	13	5/10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	20 or 13+5 ^h	13/17	30 ^h	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	20 or 13+5 ^h	15/19	30 ^h	15/19	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19/21	38 ^h	15/19	10, 4 ft	10/13

For SI: 1 foot = 304.8 mm.

- R-values are minimums. U-factors and SHGC are maximums. R-19 batts compressed into a nominal 2 x 6 framing cavity such that the R-value is reduced by R-1 or more shall be marked with the compressed batt R-value in addition to the full thickness R-value.
- The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.
- "15/19" means R-15 continuous insulated sheathing on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "10/13" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulated sheathing on the interior or exterior of the home. "10/13" means R-10 continuous insulated sheathing on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.
- R-5 shall be added to the required slab edge R-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Zones 1 through 3 for heated slabs.
- There are no SHGC requirements in the Marine Zone.
- Basement wall insulation is not required in warm-humid locations as defined by Figure 301.1 and Table 301.1.
- Or insulation sufficient to fill the framing cavity, R-19 minimum.
- "13+5" means R-13 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.
- The second R-value applies when more than half the insulation is on the interior of the mass wall.
- For impact rated fenestration complying with Section R301.2.1.2 of the *International Residential Code* or Section 1608.1.2 of the *International Building Code*, the maximum U-factor shall be 0.75 in Zone 2 and 0.65 in Zone 3.

2009 INTERNATIONAL ENERGY CONSERVATION CODE®

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Construction documents

Building Permit applications will require submittal of the following construction documents:

- insulation materials and R values
- fenestration U-values and Solar Heat Gain Coefficient (SHGC)
- Mechanical system design criteria
- HVAC and DHW sizes and efficiencies
- Duct sealing
- Lighting
- Air sealing details

We typically provide the building official with the R-values of the insulation to be installed, with the U-values and SHGC of the glazing. Now design documents are to be submitted indicating the mechanical system criteria, with duct information, and mechanical testing to ensure the ducts are sealed properly.

There is to be air sealing details indicating how we are to seal various connection between assemblies. In the past it was assumed it would be done, now it has to be documented.

MANDATORY REQUIREMENTS

401.3 - Certificate

the builder must place a permanent certificate on or in the electrical distribution panel. The certificate shall list the predominant R-values of insulation installed in/on ceiling/roof, walls, foundation (slab, basement walls) or floors, ducts outside the conditioned spaces; U-factors for fenestration and the solar heat gain coefficient of fenestration.

The certificate shall list the types and efficiencies of heating, cooling and service water heating appliances.

402.4 - Air Leakage

The building thermal envelope shall be durably sealed to limit infiltration. 402.4.2 requires the building envelope air tightness and insulation installation shall be demonstrated to comply with one of the following options:

1. Testing Option - a mechanical test to determine the number of air exchanges per hour in the conditioned area.
2. Visual Inspection Option - a 17 part checklist of various assemblies and connections to be visually inspected and certified meeting the requirements of the code. The building official may require this to be done by an independent third party.

403.1 - Mandatory Controls - At least one thermostat shall be provided for each separate heating and cooling system. Where the primary heating system is a forced-air furnace, at least one thermostat shall be capable of controlling the heating and cooling system on a daily schedule (programmable).

403.2 Ducts - Supply air ducts in attics shall be insulated to a minimum of R-8. All other ducts shall be insulated to a minimum of R-6.

403.2.2 Sealing - All ducts, air handlers, filter boxes, and building cavities used as ducts shall be sealed. Duct tightness shall be verified by either of the following:

1. Post Construction Test
2. Rough-in Test

“JUST WHEN I THINK I UNDERSTAND THE RULES OF THE GAME, THEY CHANGE THE GAME”

MANDATORY REQUIREMENTS

continued from left column

both tests are mechanical tests. Duct tightness test is not required if the air handler and all ducts are located within conditioned space.

403.5 - Mechanical System Piping Insulation - mechanical system piping capable of carrying fluids above 105 ° F or below 55 ° F shall be insulated to a minimum of R-3.

403.4 - Circulating hot water system - all circulating service hot water piping shall be insulated to at least R-2.

403.5 - Mechanical Ventilation - Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

403.9 Pools - Pools shall be provided with energy conservation measures as follows:

- all pool heaters shall be equipped with a readily accessible on-off switch to allow shutting off the heater without adjusting the thermostat. Gas fired heaters shall not have a continuously burning pilot light.
- heated pools shall be equipped with a vapor-retardant pool cover.

You should get a copy of the Energy Code and study each requirement for yourself.

If you are interested in purchasing a copy please let me know as I can get them at a discount as I am a member of the International Code Council.

Insulation, Insulation, Insulation

Air Barriers and Thermal Barriers

Air barriers must be installed on each side of the insulation. An air barrier can be exterior sheathing, or drywall board. The insulation must be installed in substantial contact and continuous alignment with the air barrier. If there are any gaps between the insulation and the air barrier it must be sealed. This is one of the visual inspection items on the checklist.

Air permeable insulation (such as fiberglass) is not used as a sealing material. Air permeable insulation is inside of an air barrier.

NOW THE BIGGIE

It was said in the class I attended that was being taught by the State (mainly building officials present) that strapping on ceilings (or anywhere else) is not allowed for fiberglass insulation because you could not have an air barrier in substantial contact with the insulation because your drywall board would be 3/4" away from the insulation. It was said that use of rigid insulation board applied to the bottom of the ceiling joists and then the application of strapping would be in compliance, or you could install batt insulation with an air barrier attached, then install your strapping, or you could opt to use mechanical test to prove compliance with the code. There are issues however when doing a cathedral ceiling where you have to provide an air space for ventilation, yet your insulation must have an air barrier on both sides.

Of course all this becomes mute with the application of spray foam insulation as it is not only insulation, but is considered an air barrier.

Other highlights

- Insulated headers and corner studs
- R-38 ceiling insulation may be reduced to R-30 if you can obtain full thickness over the outside walls without compressing the insulation (2x10 attic floor joists or raised heel trusses)
- access hatches must be weather stripped & provide equivalent insulation as the surrounding area
- air sealing provided between attached garage and conditioned spaces
- sealing of all duct shafts, knee walls and flue shafts opening to the exterior or unconditioned spaces
- fireplace walls must contain an air barrier
- showers and tubs on exterior walls must have insulation and an air barrier separating them from the exterior wall
- fireplaces shall have gasketed doors and outdoor combustion air intake (MANDATORY) 402.4.3 Fireplaces
- Recessed lighting must have a sealed housing or gasketed to finish (MANDATORY) 402.4.5 Recess Lighting

We won't get into the Massachusetts Stretch Energy Code, which towns may opt into requiring (first State to use this). I've only hit upon the high points. This was a 6-hour class, plus I've taken two online courses dealing with the new code.

Please remember, it is up to the local building official as to what their interpretation of the code is. They may or may not require mechanical testing or an independent third party to certify the Visual Inspection Checklist, or any other items. These are merely my opinions based upon the courses I've taken and my interpretation of the code.

Call if you have any questions