

# The 2009 IECC Changes

(Well at least some of them)  
(and pay no attention to the section numbers)

## **101.4.3 Additions, alterations, renovations or repairs.**

Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations, or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition, comply with this code as a single building.

**Exception:** The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation are exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a conditioned space from the exterior shall not be removed.
7. Alterations that replace less than 50% of the luminaires in a space provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the alteration does not increase the installed interior lighting power.

## Definitions

**AIR BARRIER.** Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope. An air barrier may be a single material, or a combination of materials.

**HIGH-EFFICACY LAMPS.** Compact fluorescent lamps, T-8 or smaller diameter linear fluorescent lamps, or lamps with a minimum efficacy of:

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

**VAPOR RETARDER CLASS.** A measure of the ability of a material or assembly to limit the amount of moisture that passes through that material or assembly. Vapor retarder class shall be defined using the desiccant method with Procedure A of ASTM E-96 as follows:

Class I: 0.1 perm or less

Class II:  $0.1 < \text{perm} < 1.0$  perm

Class III:  $1.0 < \text{perm} < 10$  perm

**TABLE 402.1.1  
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT<sup>a</sup>**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT <sup>b</sup> U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE <sup>h</sup>	FLOOR R-VALUE	BASEMENT <sup>c</sup> WALL R-VALUE	SLAB <sup>d</sup> R-VALUE & DEPTH	CRAWL SPACE <sup>e</sup> WALL R-VALUE
1	1.20	0.75	0.30	30	13	3 / 4	13	0	0	0
2	0.65 <sup>j</sup>	0.75	0.30	30	13	4 / 6	13	0	0	0
3	0.50 <sup>j</sup>	0.65	0.30	30	13	5 / 8	19	5/13 <sup>i</sup>	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 <sup>g</sup>	13 / 17	30 <sup>f</sup>	10/13	10,2ft	10/13
6	0.35	0.60	NR	49	20 or 13+5 <sup>g</sup>	15 / 19	30 <sup>f</sup>	15/19	10,4ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	38 <sup>i</sup>	15/19	10,4ft	10/13

For SI: 1 foot = 304.8 mm.

- a. R-values are minimums. U-factors and SHGC are maximums. R-19 batts compressed into a nominal 2x6 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.
- b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.
- c. "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. "15/19" 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.
- d. 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 ft, whichever is less, in zones 1 through 3 for heated slabs.
- e. There are no SHGC requirements in the Marine zone.
- f. Or insulation sufficient to fill the framing cavity, R-19 minimum.
- g. "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.
- h. The second R-value applies when more than half the insulation is on the interior of the mass wall.
- i. Basement wall insulation is not required in warm-humid locations as defined by Figure 301.1 and Table 301.1.
- j. For impact rated fenestration complying with Section R301.2.1.2 of the IRC (or Section 1609.1.2 of the IBC), the maximum U-factor shall be 0.75 in Zone 2 and 0.65 in Zone 3.

**402.2.2 Ceilings without attic spaces.** Where Section 402.1.1 would require insulation levels above R-30 and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, the minimum required insulation for such roof/ceiling assemblies shall be R-30. This reduction of insulation from the requirements of Section 402.1.1 shall be limited to 500 square feet (46 m<sup>2</sup>) or 20% of the total insulated ceiling area, whichever is less. This reduction shall not apply to the U-factor alternative approach in Section 402.1.3 and the Total UA alternative in Section 402.1.4.

**402.2.3 Access hatches and doors.** Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level equivalent to the insulation on the surrounding surfaces. Access shall be provided to all equipment which prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened, and to provide a permanent means of maintaining the installed R-value of the loose fill insulation.

**402.5.2 Air sealing and insulation.** Building envelope air tightness and insulation installation shall be demonstrated to comply with one of the following options given by Section 402.5.2.1 or 402.5.2.2:

**402.5.2.1 Testing option.** Building envelope tightness and insulation installation shall be considered acceptable when tested air leakage is less than 7 ACH when tested with a blower door at pressure of 50 pascals. Testing shall occur after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation, and combustion appliances.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed;
2. Dampers shall be closed, but not sealed; including exhaust, intake, makeup air, back draft, and flue dampers;
3. Interior doors shall be open;
4. Exterior openings for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling system(s) shall be turned off;
6. HVAC ducts shall not be sealed; and
7. Supply and return registers shall not be sealed.

**402.5.2.2 Visual inspection option:** Building envelope tightness and insulation installation shall be considered acceptable when the items listed in Table 402.5.2, applicable to the method of construction, are field verified. Where required by the code official, an approved party independent from the installer of the insulation, shall inspect the air barrier and insulation.

**402.5.3 Fireplaces.** New wood-burning fireplaces shall have gasketed doors and outdoor combustion air.

**TABLE 402.5.2  
AIR BARRIER AND INSULATION INSPECTION**

COMPONENT	CRITERIA
Air barrier and thermal barrier	Exterior thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier. Breaks or joints in the air barrier are filled or repaired. Air permeable insulation is not used as a sealing material. Air permeable insulation is inside of an air barrier.
Ceiling / attic	Air barrier in any dropped ceiling / soffit is substantially aligned with insulation and any gaps are sealed. Attic access (except unvented attic), knee wall door, or drop down stair is sealed.
Walls	Corners and headers are insulated. Junction of foundation and sill plate is sealed.
Windows and doors	Space between window/door jambs and framing is sealed.
Rim joists	Rim joists are insulated and include an air barrier.
Floors (including above garage and cantilevered floors)	Insulation is installed to maintain permanent contact with underside of subfloor decking. Air barrier is installed at any exposed edge of insulation.
Crawlspace walls	Insulation is permanently attached to walls. Exposed earth in unvented crawlspaces is covered with class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, knee walls, and flue shafts opening to exterior or unconditioned space are sealed.
Narrow cavities	Batts in narrow cavities are cut to fit, or narrow cavities are filled by spayed/blown insulation.
Garage separation	Air sealing is provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures are airtight, IC rated, and sealed to drywall. Exception--fixtures in conditioned space.
Plumbing and Wiring	Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.
Shower / tub on exterior wall	Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.
Electrical / phone box on exterior walls	Air barrier extends behind boxes or an air sealed type boxes are installed.
Common wall	Air barrier is installed in common wall between dwelling units.
HVAC register boots	HVAC register boots that penetrate building envelope are sealed to subfloor or drywall.
Fireplace	Fireplace walls include an air barrier.

**402.7 Vapor retarders.** Class I or II vapor retarders are required on the interior side of frame walls in Zones 5, 6, 7, 8 and Marine 4.

**Exceptions:**

1. Basement walls.
2. Below grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.

**402.7.1 Class III vapor retarders.** Class III vapor retarders shall be permitted where any one of the conditions in Table 402.6.1 are met.

**TABLE 402.6.1  
CLASS III VAPOR RETARDERS**

Zone	Class III vapor retarders permitted for:
Marine 4	Vented cladding over OSB Vented cladding over Plywood Vented cladding over Fiberboard Vented cladding over Gypsum Insulated sheathing with R-value $\geq$ R2.5 over 2x4 wall Insulated sheathing with R-value $\geq$ R3.75 over 2x6 wall
5	Vented cladding over OSB Vented cladding over Plywood Vented cladding over Fiberboard Vented cladding over Gypsum Insulated sheathing with R-value $\geq$ R5 over 2x4 wall Insulated sheathing with R-value $\geq$ R7.5 over 2x6 wall
6	Vented cladding over Fiberboard Vented cladding over Gypsum Insulated sheathing with R-value $\geq$ R7.5 over 2x4 wall Insulated sheathing with R-value $\geq$ R11.25 over 2x6 wall
7 and 8	Insulated sheathing with R-value $\geq$ R10 over 2x4 wall Insulated sheathing with R-value $\geq$ R15 over 2x6 wall

**402.6.2 Material vapor retarder class.** The vapor retarder class shall be based on the manufacturers certified testing or a tested assembly. The following shall be deemed to meet the class specified:

Class I: Sheet polyethylene, non-perforated aluminum foil

Class II: Kraft faced fiberglass batts or low perm paint (paint with  $0.1 < \text{perm} < 1.0$ )

Class III: Latex or enamel paint

**402.6.3 Minimum clear air spaces and vented openings for vented cladding.** For the purposes of this section vented cladding shall include the following minimum clear air spaces. Other openings with the equivalent vent area shall be permitted.

1. Vinyl lap or horizontal aluminum siding applied over a weather resistive barrier as specified in Table R703.4 of the *International Residential Code*.
2. Brick veneer with a clear airspace as specified in Section R703.7.4.2 of the *International Residential Code*.
3. Other approved vented claddings.

**403.1.1 Programmable thermostat.** Where the primary heating system is a forced air furnace, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain zone temperatures down to 55°F (13°C) or up to 85 °F (29 °C). The thermostat shall initially be programmed with a heating temperature set point no higher than 70 °F (21 °C) and a cooling temperature set point no lower than 78 °F (26 °C).

**403.2.2 Sealing. (Mandatory)** All ducts, air handlers, filter boxes, and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.3.1 of the *International Residential Code*. Duct tightness shall be verified by either of the following:

1. Post-construction test: Leakage to outdoors shall be less than or equal to 8 CFM per 100ft<sup>2</sup> of conditioned floor area or a total leakage less than or equal to 12 CFM per 100 ft<sup>2</sup> of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
2. Rough-in test: Total leakage shall be less than or equal to 6 CFM per 100 ft<sup>2</sup> of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the roughed in system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 4 CFM per 100 ft<sup>2</sup> of conditioned floor area.

**Exception:** Duct tightness is not required if the air handler and all ducts are located within conditioned space.

**403.8 Snow melt system controls.** Snow- and ice-melting systems, supplied through energy service to the building, shall include automatic controls capable of shutting off the system when the pavement temperature is above 50°F and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F.

**403.9 Pools.** Pools shall be provided with energy conserving measures in accordance with Sections 403.9.1 through 403.9.3

**403.9.1 Pool heaters.** All pool heaters shall be equipped with a readily accessible on-off switch to allow shutting off the heater without adjusting the thermostat setting. Pool heaters fired by natural gas or LPG shall not have continuously burning pilot lights.

**403.9.2 Time switches.** Time switches that can automatically turn off and on heaters and pumps according to a preset schedule shall be installed on swimming pool heaters and pumps.

**Exceptions:**

1. Where public health standards require 24-hour pump operation.
2. Where pumps are required to operate solar-and-waste-heat-recovery pool heating systems.

**403.9.3 Pool covers.** Heated pools shall be equipped with a vapor-retardant pool cover on or at the water surface. Pools heated to more than 90°F (32°C) shall have a pool cover with a minimum insulation value of R-12.

**404.1 Interior lighting power (Prescriptive).** Lighting in spaces other than dwelling units, e.g. common areas, shall be high efficacy luminaires or shall comply with the interior lighting power requirements in Section 505.5

**Exception:** Dwelling units.

**404.2 Lighting equipment.** A minimum of fifty percent of the lamps in permanently installed lighting fixtures shall be high efficacy lamps.

**501.2 Application.** The commercial building project shall comply with the requirements in Sections 502 (Building envelope), 503 (Building mechanical systems), 504 (Service water heating) and 505 (Lighting) in its entirety. As an alternative, the commercial building project shall comply with the requirements of ASHRAE/IESNA 90.1 in its entirety.

**Exception:** Buildings conforming to Section 506, provided Sections 502.4, 502.5, 503.2, 504, 505.2, 505.3, 505.4, 505.6 and 505.7 are each satisfied.

**502.1.1 Insulation and fenestration criteria.** The building thermal envelope shall meet the requirements of Tables 502.2(1) and 502.3 based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the R-values from the "Group R" column of Table 502.2(1). Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the R-values from the "All Other" column of Table 502.2(1). Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table 502.3 shall comply with the building envelope provisions of ASHRAE/IESNA 90.1.

**502.4.4 Hot gas bypass limitation.** Cooling systems shall not use hot gas bypass or other evaporator pressure control systems unless the system is designed with multiple steps of unloading or continuous capacity modulation. The capacity of the hot gas bypass shall be limited as indicated below.

**Exception:** Unitary packaged systems with cooling capacities not greater than 90,000 Btu/h

**TABLE 502.4.4  
MAXIMUM HOT GAS BYPASS CAPACITY**

<b>RATED CAPACITY</b>	<b>MAXIMUM HOT GAS BYPASS CAPACITY (% of Total Capacity)</b>
≤ 240,000 Btu/h	50%
> 240,000 Btu/h	25%

(Renumber subsequent sections)

**Reason:** This proposal addresses hot gas bypass. While hot gas bypass is a somewhat technical concept, explanation of it is simple and enforcement should be simple as well. Hot gas bypass is simply a control strategy used in commercial cooling and refrigeration equipment that allows cooling compressors to remain online at low load and in colder weather by raising the condenser pressure. However, to accomplish this, this type of system does waste energy. Many new commercial cooling units do not use hot gas bypass, but those that do waste a lot of energy unless they also have capacity to modulate or unload capacity. Enforcement of this requirement would be limited to review of design specifications and HVAC system control information as required in Section 503.2.9.3, Manuals.

This proposal makes consistent (to the extent possible) the prescriptive text of the IECC and the corresponding text of the commercial reference standard – ASHRAE/IESNA Standard 90.1. The reference sections for ASHRAE/IESNA Standard 90.1 are taken from ANSI/ASHRAE/IESNA Standard 90.1-2004.

**Cost Impact:** The code change proposal may result in a slight cost increase for those commercial cooling systems that do not already employ these capacity modulation devices.

**505.5.1 Total connected interior lighting power.** The total connected interior lighting power (watts) shall be the sum of the watts of all interior lighting equipment as determined in accordance with Sections 505.5.1.1 through 505.5.1.4.

**Exceptions:**

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power:
  - 1.1 Professional sports arena playing field lighting.
  - 1.2 Sleeping unit lighting in hotels, motels, boarding houses or similar buildings.
  - 1.3 Emergency lighting automatically off during normal building operation.
  - 1.4 Lighting in spaces specifically designated for use by occupants with special lighting needs including the visually impaired visual impairment and other medical and age related issues.
  - 1.5 Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
  - 1.6 Casino gaming areas.
2. Lighting equipment used for the following shall be exempt provided that it is in addition to general lighting and is controlled by an independent control device:
  - 2.1 Task lighting for medical and dental purposes.
  - 2.2 Display lighting for exhibits in galleries, museums and monuments.
3. Lighting for theatrical purposes, including performance, stage, film production and video production.
4. Lighting for photographic processes.
5. Lighting integral to equipment or instrumentation and is installed by the manufacturer.
6. Task lighting for plant growth or maintenance.
7. Advertising signage or directional signage.
8. In restaurant buildings and areas, lighting for food warming or integral to food preparation equipment.
9. Lighting equipment that is for sale.
10. Lighting demonstration equipment in lighting education facilities.
11. Lighting approved because of safety or emergency considerations, inclusive of exit lights.
12. Lighting integral to both open and glass-enclosed refrigerator and freezer cases.
13. Lighting in retail display windows, provided the display area is enclosed by ceiling height partitions.
14. Furniture mounted supplemental task lighting that is controlled by automatic shutoff.