Overview of the 2009 IECC

SCOPE OF THE IECC®

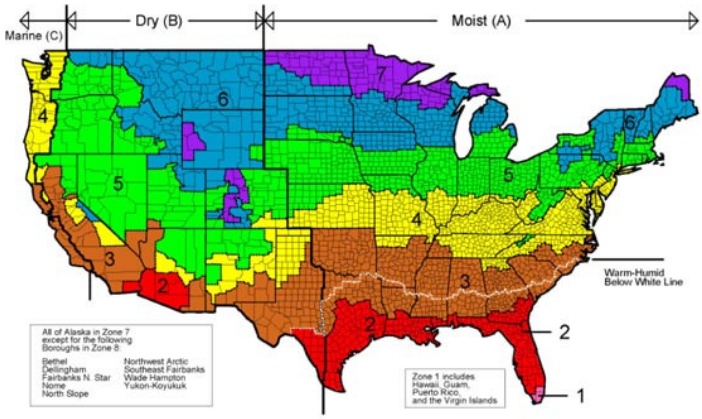
The IECC® covers new construction, additions, remodeling, window replacement, and repairs of specified buildings. The Residential portion of the Code applies to buildings that are detached one- and two-family dwellings and buildings that contain three or more dwelling units and is three stories or less in height above grade. Commercial buildings are covered as well. A building is considered to be commercial when it is over three stories in height above grade or when it is below three stories and is not a residential building.

The Code provisions are intended to ensure the design of energy efficient building envelopes. They also address the energy efficiency of elements that do not affect the building envelope, such as mechanical, water heating, electrical, and lighting equipment. The envelope requirements focus on insulation requirements for ceilings, walls, and floors and on thermal conductance of windows and doors.

CLIMATE ZONES

The Code requirements vary by region. The regions are determined based on the climate and, hence, are called "climate zones." Each county in the country is sorted into one of eight climate zones and sub-categorized based on climate type (moist, dry and marine).

For help in determining the climate zone in which your project is located, use the map below:



Residential Energy Efficiency

For residential buildings the requirements in Chapter 4 are only relievent to the types of buildings defined above. Chapter 4 covers new construction, additions, remodeling, window replacement, and repairs of specific buildings. Existing installations are exempted, as are portions of buildings not altered when additions, remodeling, window replacement, or repairs take place. Historic residences are also exempted from meeting the requirements of the Code. The table below summarizes the prescriptive paths in a chart form and some additional requirements to be noted are contained in the following bullets:

- Section 402.2.1 may be used to allow for less insulation in the ceiling without attic space when the requirements are above R - 30 only when the floor area is less than 500 square feet or 20% of the total conditioned space.
- Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the building thermal envelope requirements.
- Requires a space that was previously unconditioned to be brought into full compliance if the space is conditioned.

Source: IECC 2009 TABLE 402.1.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

CLIMATE ZONE	FENESTRATION U-FACTOR[b]	SKYLIGHT U-FACTOR[b]	FENESTRATION SHGC[b,e]	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[i]	FLOOR R-VALUE	BASEMENT WALL R-VALUE[c]	SLAB R-VALUE & DEPTH[d]	CRAWL SPACE WALL R-VALUE[c]
1	1.2	0.75	0.4	30	13	3	13	0	0	0
2	0.65[j]	0.75	0.4	30	13	4	13	0	0	0
3	0.5[j]	0.65	0.4	30	13	5	19	5 / 13[f]	0	5 / 13
4 except Marine	0.35	0.6	NR	38	13	5	19	10 / 13	10, 2 ft.	10 / 13
5 and Marine 4	0.35	0.6	NR	38	20 or 13+5[h]	13	30[g]	10 / 13	10, 2 ft.	10 / 13
6	0.35	0.6	NR	49	20 or 13+5[h]	15	30[g]	15 / 19	10, 4 ft.	10 / 13
7 and 8	0.35	0.6	NR	49	21	19	38[g]	15 / 19	10, 4 ft.	10 / 13

a. R-values are minimums. U-factors and SHGC are maximums. R-19 batts compressed into a normal 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. 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 continous insulated sheathing on the interior or exterior of the home. "10/13" means R-10 continous 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 feet, whichever is less in Zone 1 through 3 for heated slabs.
e. There are no SHGC requirements in the Marine Zone.
f. Basement wall insulation is not required in warm-humid locations as defind by Figure 301.1 and Table 301.1
g. Or insulation sufficient to fill the framing cavity, R-19 minimum.
h. "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, stuctural sheathing shall be supplemented with insulation sheathing of at least R-2.
i. The second R-value applies when more than half of the insulation is on the interior of the mass wall.
j. For impact reated 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.

Commercial Energy Efficiency

For commercial buildings and residential buildings over three stories in height the building must comply with the energy efficiency requirements set forth in Chapter 5 of the 2009 IECC® or ASHRAE/IESNA 90.1. The 2006 version of the IECC diferentiated between Glass and Plastic skylights while the 2009 version does not. The tables below summarizes the prescriptive paths in a chart form.

Source: IECC 2009 TABLE 502.3
BUILDING ENVELOPE REQUIREMENTS: FENESTRATION

Climate Zone	1	2	3	4 Except Marine	5 and Marine 4	6	7	8
Vertical Fenestration (40% manimum of above-grade wall)								
U-Factor								
Framing materials other than metal with or without metal reinforcement of cladding								
U-Factor	1.2	0.75	0.65	0.4	0.35	0.35	0.35	0.35
Framing with or without thermal break								
Curtain Wall/Storefront U-Factor	1	0.7	0.6	0.5	0.45	0.45	0.4	0.4
Entrance Door U-Factor	1.2	1.1	0.9	0.85	0.8	0.8	0.8	0.8
All Other U-Facotr	1.2	0.75	0.65	0.55	0.55	0.55	0.45	0.45
SHGC-All Frame Types								
SHGC: PF < 0.25	0.25	0.25	0.25	0.4	0.4	0.4	0.45	0.45
SHGC: 0.25 < PF < 0.5	0.33	0.33	0.33	NR	NR	NR	NR	NR
SHGC > 0.5	0.4	0.4	0.4	NR	NR	NR	NR	NR
Skylights (3% Maximum)								
U-Factor	0.75	0.75	0.65	0.6	0.6	0.6	0.6	0.6
SHGC	0.35	0.35	0.35	0.4	0.4	0.4	NR	NR

a. All others includes operable windows, fixed windows and nonentrance doors.

Source: IECC 2009 TABLE 502.2(1)

BUILDING ENVELOPE REQUIREMENTS - OPAQUE ASSEMBLIES

Climate Zone	1	2	3	4 Except Marine	5 and Marine 4	6	7	8
Roofs								
Insulation entirely above deck	R-15ci	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-25ci	R-25ci
Metal buildings (with R-5 thermal blocks)[a,b]	R-19	R-13 + R-13	R-13 + R-13	R-13 + R-13	R-13 + R-13	R-13 + R-19	R-13 + R-19	R-11 + R-19
Attic and other	R-30	R-38	R-38	R-38	R-38	R-38	R-38	R-49
Walls, Above Grade								
Mass	NR	R-5.7ci	R-7.6ci	R-9.5ci[c]	R-11.4ci	R-13.3ci	R-15.2ci	R-25ci
Metal building[b]	R-16	R-16	R-19	R-19	R-13 + R-5.6ci	R-13 + R-5.6ci	R-19 + R-5.6ci	R-19 + R-5.6ci
Metal framed	R-13	R-13	R-13	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci
Wood framed and other	R-13	R-13	R-13	R-13	R-13 + R-3.8 ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci
Walls, Below Grade								
Below grade wall[d]	NR	NR	NR	NR	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci
Floors								
Mass	NR	R-6.3ci	R-6.3ci	R-10ci	R-10ci	R-12.5ci	R-15ci	R-15ci
Joist/Framing	NR	R-19	R-19	R-19	R-19	R-30	R-30	R-30[e]
Slab-on-Grade Floors								
Unheated slabs	NR	NR	NR	NR	NR	R-10 for 24 in.	R-15 for 24 in.	R-15 for 24 in.
Heated slabs	R-7.5 for 12 in.	R-7.5 for 12 in.	R-10 for 24 in.	R-15 for 24 in.	R-15 for 24 in.	R-15 for 24 in.	R-20 for 24 in.	R-20 for 48 in.
Opaque Doors								
Swinging	U-0.7	U-0.7	U-0.7	U-0.7	U-0.7	U-0.7	U-0.5	U-0.5
Roll-up or sliding	U-1.45	U-1.45	U-1.45	U-0.5	U-0.5	U-0.5	U-0.5	U-0.5

a. When using R-value compliance method, a thermal spacer block is required, otherwise use the U-factor compliance method. [see Tables 502.1.2 and 502.2(2)]

b. Assembly descriptions can be found in Table 502.2(2)

c. R-5.7 ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores

d. When heated slabs are placed below grade, below-grade walls must meet the exterior insultation requirements for perimeter insulation according to the heated slab-on-grade construction.

e. Steel floor joist systems shall to be R-38.

Group R includes, amongst other buildings, residential buildings with more than 2 dwellings and residential occupancies where the occupants are primarily transient in nature (less than 30 days).

Source: IECC 2009 TABLE 502.2(1)

BUILDING ENVELOPE REQUIREMENTS - OPAQUE ASSEMBLIES "GROUP R"

Climate Zone	1	2	3	4 Except Marine	5 and Marine 4	6	7	8
Roofs								
Insulation entirely above deck	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-25ci	R-25ci
Metal buildings (with R-5 thermal blocks)[a,b]	R-19	R-13 + R-13	R-19	R-19	R-19	R-19	R-19 + R-10	R-19 + R-10
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-49
Walls, Above Grade								
Mass	R-5.7ci	R-7.6ci	R-9.5ci	R-11.4ci	R-13.3ci	R-15.2ci	R-15.2ci	R-25ci
Metal building[b]	R-16	R-16	R-19	R-19	R-13 + R-5.6ci	R-13 + R-5.6ci	R-19 + R-5.6ci	R-19 + R-5.6ci
Metal framed	R-13	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-18.8ci
Wood framed and other	R-13	R-13	R-13	R - 13 + R - 3.8 ci	R - 13 + R - 3.8 ci	R - 13 + R - 7.5 ci	R - 13 + R - 7.5 ci	R - 13 + R - 15.6 ci
Walls, Below Grade								
Below grade wall[d]	NR	NR	NR	R-7.5 ci	R-7.5 ci	R-7.5 ci	R-7.5 ci	R-7.5 ci
Floors								
Mass	NR	R-8.3ci	R-8.3ci	R-10.4ci	R-12.5ci	R-14.6ci	R-16.7ci	R-16.7ci
Joist/Framing	NR	R-30	R-30	R-30	R-30	R-30[e]	R-30[e]	R-30
Slab-on-Grade Floors								
Unheated slabs	NR	NR	NR	NR	R-10 for 24 in. below	R-10 for 24 in. below	R-15 for 24 in. below	R-20 for 24 in. below
Heated slabs	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-10 for 24 in. below	R-15 for 24 in. below	R-15 for 24 in. below	R-20 for 48 in. below	R-20 for 48 in. below	R-20 for 48 in. below
Opaque Doors								
Swinging	U-0.7	U-0.7	U-0.7	U-0.7	U-0.7	U-0.5	U-0.5	U-0.5
Roll-up or sliding	U-1.45	U-1.45	U-1.45	U-0.5	U-0.5	U-0.5	U-0.5	U-0.5

a. When using R-value compliance method, a thermal spacer block is required, otherwise use the U-factor compliance method. [see Tables 502.1.2 and 502.2(2)]

b. Assembly descriptions can be found in Table 502.2(2)

c. R-5.7 ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores

d. When heated slabs are placed below grade, below-grade walls must meet the exterior insultation requirements for perimeter insulation according to the heated slab-on-grade construction.

e. Steel floor joist systems shall to be R-38.