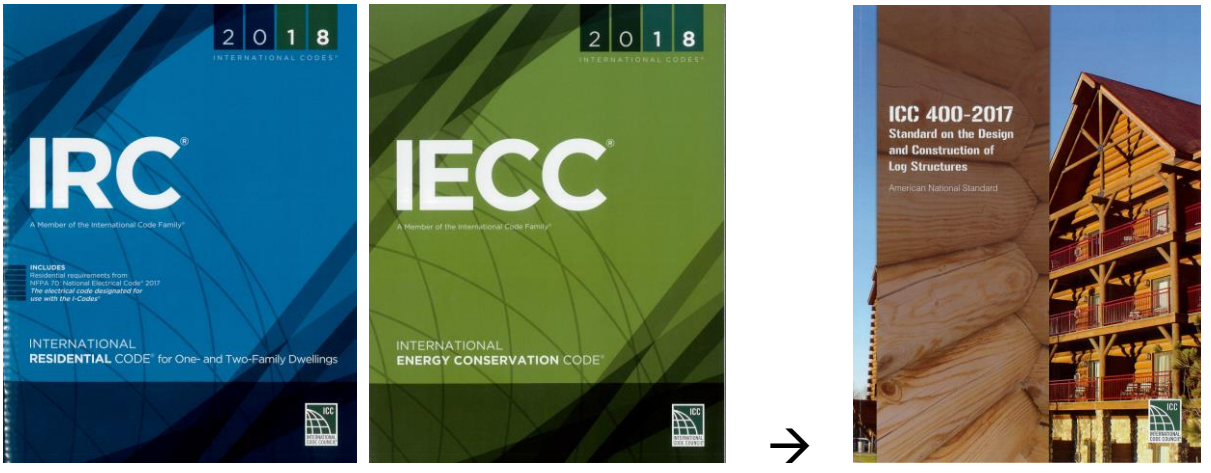
Understanding the Energy Code and Log Homes

The IRC International Residential Code is the general guide for all aspects of the building project. The Energy Section in the IRC copies the information from the IECC International Energy Conservation Code in determining the requirements for the thermal properties required for your home.

The IRC and the IECC both reference Mass Walls (N1102.2.5 IRC) (R402.2.5 IECC) and that is where you must consult the ICC Standard On The Design And Construction Of Log Structures for the specifics on how to handle the Energy Code for a log home.

Simple Illustration:



IRC/IECC direct you to the ICC400 Standard on The Design And Construction Of Log Structures

N1102.2.5 (R402.2.5) Mass walls. Mass walls for the purposes of this chapter shall be considered above-grade walls of concrete block, concrete, insulated concrete form (ICF), masonry cavity, brick (other than brick veneer), earth (adobe, compressed earth block, rammed earth) and solid timber/logs.

CHAPTER 4 [RE]

RESIDENTIAL ENERGY EFFICIENCY

User note:

About this chapter: Chapter 4 provides requirements for the thermal envelope of a building, including minimum insulation values for walls, ceiling and floors; maximum fenestration U-factors; minimum fenestration solar heat gain coefficients; and methods for determining building assembly and a total building U-factor. A performance alternative and an energy rating alternative are also provided to allow for energy code compliance other than by the prescriptive method.

SECTION R401
GENERAL

R401.1 Scope. This chapter applies to *residential buildings*.

R401.2 Compliance. Projects shall comply with one of the following:

1. Sections R401 through R404.
2. Section R405 and the provisions of Sections R401 through R404 indicated as "Mandatory."
3. The energy rating index (ERI) approach in Section R406.

R401.2.1 Tropical zone. *Residential buildings* in the tropical zone at elevations less than 2,400 feet (731.5 m) above sea level shall be deemed to be in compliance with this chapter provided that the following conditions are met:

1. Not more than one-half of the occupied space is air conditioned.
2. The occupied space is not heated.
3. Solar, wind or other renewable energy source supplies not less than 80 percent of the energy for service water heating.
4. Glazing in *conditioned spaces* has a *solar heat gain coefficient* of less than or equal to 0.40, or has an overhang with a projection factor equal to or greater than 0.30.
5. Permanently installed lighting is in accordance with Section R404.
6. The exterior roof surface complies with one of the options in Table C402.3 or the roof or ceiling has insulation with an *R*-value of R-15 or greater. Where attics are present, attics above the insulation are vented and attics below the insulation are unvented.
7. Roof surfaces have a slope of not less than one-fourth unit vertical in 12 units horizontal (21-percent slope). The finished roof does not have water accumulation areas.
8. Operable fenestration provides a ventilation area of not less than 14 percent of the floor area in each room. Alternatively, equivalent ventilation is provided by a ventilation fan.
9. Bedrooms with *exterior walls* facing two different directions have operable fenestration on *exterior walls* facing two directions.
10. Interior doors to bedrooms are capable of being secured in the open position.
11. A ceiling fan or ceiling fan rough-in is provided for bedrooms and the largest space that is not used as a bedroom.

R401.3 Certificate (Mandatory). A permanent certificate shall be completed by the builder or other *approved* party and posted on a wall in the space where the furnace is located, a utility room or an *approved* location inside the *building*. Where located on an electrical panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall indicate the predominant *R*-values of insulation installed in or on ceilings, roofs, walls, foundation components such as slabs, *basement walls*, crawl space walls and floors and ducts outside *conditioned spaces*; *U*-factors of fenestration and the *solar heat gain coefficient* (SHGC) of fenestration, and the results from any required duct system and *building* envelope air leakage testing performed on the *building*. Where there is more than one value for each component, the certificate shall indicate the value covering the largest area. The certificate shall indicate the types and efficiencies of heating, cooling and service water heating equipment. Where a gas-fired unvented room heater, electric furnace or baseboard electric heater is installed in the residence, the certificate shall indicate "gas-fired unvented room heater," "electric furnace" or "baseboard electric heater," as appropriate. An efficiency shall not be indicated for gas-fired unvented room heaters, electric furnaces and electric baseboard heaters.

SECTION R402
BUILDING THERMAL ENVELOPE

R402.1 General (Prescriptive). The *building thermal envelope* shall comply with the requirements of Sections R402.1.1 through R402.1.5.

Exceptions:

1. The following low-energy *buildings*, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this section shall be exempt from the *building thermal envelope* provisions of Section R402.
   1.1. Those with a peak design rate of energy usage less than 3.4 Btu/h • ft^2 (10.7 W/m^2) or 1.0 watt/ft^2 of floor area for space-conditioning purposes.
   1.2. Those that do not contain *conditioned space*.
2. Log homes designed in accordance with ICC 400.

TABLE 305.3.1.2
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	LOG WALL, W_t[h]	FENESTRATION U-FACTOR[b]	SKYLIGHT U-FACTOR[b]	FENESTRATION SHGC[b]	CEILING R-VALUE	WOOD FRAME WALL R-VALUE[c]	FLOOR R-VALUE[d, e]	BASEMENT[f] / CRAWL WALL R-VALUE	SLAB R-VALUE & DEPTH	HEATED SLAB R-VALUE[g]
1	5" min.	0.50	0.75	0.25	30	13	13	0	0	5
2	5" min.	0.40	0.65	0.25	38	13	13	0	0	5
3	5" min.	0.35	0.55	0.25	38	20 or 13 + 5	19	5 / 13	5, 2-ft.	5
4 & MARINE	5" min.	0.33	0.55	0.40	49	20 or 13 + 5	19	10 / 13	10, 2-ft.	10
5 EXCEPT MARINE	5" SG ≤ 0.50; 7" SG > 0.50	0.32	0.55	NR	49	20 or 13 + 5	30	15 / 19	10, 2-ft.	10
6		0.30	0.55	NR	49	20 or 13 + 5	30	15 / 19	15, 4-ft.	15
7 & 8		0.30	0.55	NR	49	20 + 5 or 13 + 10	38	15 / 19	15, 4-ft.	15

For SI: 1 foot = 304.8 mm.

Notes to Table 305.3.1.2:

a. R-values are minimums. U-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed R-value of the insulation shall not be less than the R-value specified in the table.

b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in climate zones 1–3, where the SHGC for such skylights does not exceed 0.30.

c. "13+5" means R-13 cavity insulation plus R-5 continuous insulation. 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.

d. Or insulation sufficient to fill the framing cavity, with R-19 as the absolute minimum in Climate Zones 5–8.

e. Insulate perimeter of floor system to match floor R-value requirement with basement/crawl foundations.

f. "15 / 19" means R-15 continuous insulation 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-10 continuous insulation on the interior or exterior of the home.

g. The required insulation shall be installed beneath the entire slab for heated slabs.

h. W_t is the average wall-log width. Nominal callouts will be larger (e.g., a 5" log would be 6x or 7" diameter; a 7" would be 8x or 9" diameter). SG = specific gravity.