2006 International Energy Conservation Code

Residential Compliance Instructions and Forms

12/29/2009

Purpose:

This code was designed to conserve our national resources and to defray ever-increasing energy costs to the home owner. The Federal Department of Energy, the State of Tennessee, and the City of Kingsport have mandated that all new construction meet or exceed the minimum requirements of the 2006 International Energy Conservation Code.

Compliance with this code will insure that you will have comfortable, energy efficient living environment**.**

METHODS OF COMPLIANCE: The builder may demonstrate compliance with the 2006 International Energy Conservation Code in one of 4 ways:

Method 1: The simplest way to comply is to use the **Simplified Prescriptive Method** (see below). This method requires you to meet or exceed the minimum listed values that appear in IECC Tables 402.1.1 and 402.1.3.

Method 2: When trying to comply for an entire new home, you may use the **Residential Component Performance Method.** A complete area measurement for all exterior walls, common walls between the house and garage, all ceilings and rough window and door openings is required. Then you must compute compliance per the attached worksheet.

Method 3: (Recommended for new homes) Use of U.S. Department of Energy's on-line software *REScheck:*
The component performance analysis is greatly simplified by utilizing the *REScheck* software available on the DOE web link in lieu of a calculations worksheet. The link is (**www.energycodes.gov** **)** and is free to all users. In this program, the designer may manipulate or trade off the various building energy components within the wall and roof assemblies in order to provide the most compliant and desirable building envelope.

Method 4: Simulated Performance Alternative per IECC Sec. 404: (This approach must be calculated and prepared by you design professional.
The section establishes criteria for compliance using simulated energy performance analysis software, usually used by professional energy experts, mechanical engineering firms and some architects. Such analysis shall include heating, cooling, and service water heating energy only. Compliance with this section of the code requires that the criteria established in amended IECC Sections 401, 402.4, 402.5 be met.

DEFINITIONS

The following are terms that you should become familiar with:

Approved Material: Any material specifically listed in the building code or that is approved by the code jurisdiction in which you live that has authority to require the building permit. The persons having authority in your jurisdiction with regards to approving materials are the building department plans examiners and the field building inspectors.

Air Barrier: A component of the thermal energy envelope comprised of approved solid opaque materials that supports in-contact insulation materials on one side and is sealed to prevent any leakage of air through the building enclosure. The air barrier can be comprised of, but not limited to, the exterior siding exterior lath and stucco, rigid insulation board, exterior sheathing and sub-sheathing water proof substrate with tiles, masonry, or stone veneers, roof sheathing and drywall between conditioned and unconditioned attic spaces.

Building Thermal Energy Envelope: The basement walls, exterior walls, floor, roof and any other building element comprised of a solid air barrier and approved insulation components in substantial, direct contact with it that encloses or separates conditioned space from any exempt or unconditioned space or outside air.

Fenestration Components: Fenestrations are skylights, roof windows, vertical wall windows (both fixed and openable), opaque (solid) doors, glazed doors, glazed block, and combination opaque/glazed doors.

Fenestration Area: When calculating the fenestration openings, you should be using the rough openings that the fenestrations fit into, which basically includes the window glass and the frames.

Mass Wall: Walls constructed of concrete block (CMU), concrete, insulated concrete forms (ICF), masonry cavity, brick, (other than brick veneer), and earth (adobe, rammed earth, compressed earth blocks, or solid timber/logs).

R-Value: The measurement of the rate of time it takes for heat to flow through a material to an area of cooler temperature.

SHGC (Solar Heat Gain Coefficient): The ratio of the solar heat gain entering the space through the window assembly to the solar heat radiation generated by the sun on the exterior side of the window. Solar heat gain includes directly transmitted solar hear and absorbed solar radiation which is then reradiated, conducted or convected into the space. (The lower the SHGC the less radiated sunlight will be allowed in to heat the interior of a room. Heat moves to cold. If the radiating temperature on the exterior side of the window is allowed to enter through the window glass without “blocking” it, it will heat up the interior of the room fairly quickly. Many new window glass products, such as tinted windows or low-E glass, block the rays of the sun from entering into the room to heat up the space. For example, if the sun is shining on a window and the window only allows in half of the radiating heat from the sun into the room, it is said to have an SHGC of 0.5.

U-Value: The inverse measurement of the R-Value. It is just another form of measurement of the rate of time it takes for heat to flow through a material to a cooler surface. The fenestration components are usually measured in terms of U-Value, where insulation products are usually stated in R-Values.

SIMPLIFIED PRESCRIPTIVE METHOD

This is the simplest way to demonstrate compliance with the 2006 IECC for your project. Utilize this table to ensure compliance with the 2006 IECC. The table is geared toward owner-builders or small contractors for room additions projects. All the building components must merely meet or exceed the minimum requirements of the following tables.

IECC TABLE 402.1.1
INSULATOIN AND FENESTRATION REQUIREMENTS BY COMPONENT

1 Climate Zone	2 Fenestration U-Factor	3 Skylight U-Factor	4 Maximum Glazed Fenestration SHGC	5 Ceiling R-Value	6 Wood Framed Walls R-Value	7 Mass Wall R-Value	8 Floor R-Value	9 Basement Wall R-Value	10 Slab R-Value	11 Crawl Space Wall R-Value
4	0.40	0.60	NR	38	13	5	19	10/13	10, 2 ft	10/13
EQUIVALENT U-FACTORS PER TABLE 402.1.3										
4	0.40	0.60		0.03	0.082	0.141	0.047	0.059		0.065

Explaining the Tables

Column 1: Kingsport is in IECC Zone 4.

Column 2: The maximum U-factor allowed for Zone 4. Windows and glazed doors are required to have a National Fenestration Rating Council authorized sticker affixed to each window. This label states the U-Value and SHGC rating for the window and the window air leakage rate. The labels must remain on the window until building final. Values less than or equal to those listed in the tables are acceptable.

Column 3: The maximum allowable U-Value of the skylight. See the NFC label on the unit.

Column 4: Not required in Zone 4.

Column 5: The minimum R-Value rating of the insulation for your attic. The insulation may be installed between the ceiling joists or bottom chord of the roof trusses or it may be affixed to the underside of and in direct contact with, the roof sheathing. (See manufacturer's installation instructions).

Column 6: The minimum R-Value required to be installed in the walls of the conditioned room or space. If more than one type of insulation is being installed the R-Values may be added together to meet the minimum requirements of the table. As an example, if you are using a 1-coat stucco system with 1" polystyrene foam board insulation rated at R2, this may be added to the rated R-Value of the glass fibered insulation being installed within the walls.

Column 7: The minimum R-Value of the insulation used on mass walls (see definition above). Note that in order to use this minimum value, at least 50% of the required insulation R-Value must be installed on the exterior side of the wall. If not, then the walls must be furred out and the minimum R-Value for wood walls must be used on the interior side.

Column 8: The minimum requirements for floors over crawl spaces or for conditioned rooms that overhang exterior walls or are located over unheated garages. Be aware that the code requires floor insulation to be installed to maintain permanent contact with the underside of the sub-floor decking only.

Column 9: A basement wall is a wall that is at least 50% below grade. Exterior walls associated with conditioned basements shall be insulated from the top of the basement wall down to 10 feet below grade or to the basement floor, which ever is less. A minimum of R-10 if directly/permanently attached with furred walls or R-13 for build-out walls. Walls associated with unconditioned basements shall comply with insulation requirements unless the floor overhead is insulated with R-19.

Column 10: Slab on grade floors with surfaces less than 12 inches below grade shall be insulated R-10 2 feet out.

- **A) The R-10 insulation shall extend downward from the top of the slab on the outside or inside of the foundation wall.**
- **B) Insulation located below grade shall be extended by 2 feet by any combination of vertical insulation, insulation extending under the slab or insulation extending out from the building.**
- **C) Insulation extending away from the building shall be protected by pavement or a minimum of 10 inches of soil.**
- **D) The top edge of the insulation installed between the exterior wall and the edge of the interior slab shall be permitted to be cut at a 45 degree angle away from the exterior wall.**

Column 11: When houses are constructed over crawl spaces, insulation may be installed at the exterior crawl space walls in lieu of under the floor decking of the house. When this is planned, the first number in the column, R-10, is the minimum R-Value of the insulation if it is being installed continuously on the crawl space foundation wall (interior or exterior side). The second number, R-13, is the minimum insulation rating required if the interior side of the crawl space wall is to be furred our and the batts installed between the studs.

What if my windows are not labeled with NFRC information?

If a builder wishes to relocate existing windows or has purchased used windows that are not rated, he must attempt to justify the ratings with substantial evidence to the inspector. This would entail providing a sticker that was originally on the window when installed or would require a manufacturer's or approved testing agency's letter verifying the information required for the unit. If this cannot be done, then default values must be assigned per the following tables.

IECC Table 102.1.3(1)
DEFAULT GLAZED FENESTRATION U-FACTOR

FRAME TYPE	SINGLE PANE	DOUBLE PANE	SKYLIGHT SINGLE PANE	SKYLIGHT DOUBLE PANE
METAL	1.2	0.8	2.00	1.30
METAL W/ THERMAL BREAK	1.10	0.65	1.90	1.10
NON-METAL OR METAL CLAD	0.95	0.55	1.75	1.05
GLAZED BLOCK	0.60	0.60	0.60	0.60

IECC Table 102.1.3(2)

DOOR TYPE	U-FACTOR
UN-INSULATED METAL	1.20
INSULATED METAL	0.60
WOOD	0.50
Insulated, Non-metal edge, max 45% glazing, any glazing double pane	0.35

IECC Table 102.1.3(3)
DEFAULT GLAZED FENESTRATION SHGC

SINGLE GLAZED		DOUBLE GLAZED		GLASS BLOCK
CLEAR	TINTED	CLEAR	TINTED	
0.8	0.7	0.7	0.6	0.6

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N1101.4.1 The thickness of blown in or sprayed roof/ceiling insulation (fiberglass or cellulose) shall be written in inches on markers that are installed at least one for every 300 sq ft throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers a minimum of 1 inch high. Each marker shall face the attic opening. Spray polyurethane foam thickness and installed R-Value shall be listed on the certificate provided by the insulation installer.

N1101.8 A permanent certificate shall be posted on or in the electrical distribution panel. The certificate shall be completed by the builder or registered design professional. The certificate shall list the predominant R-Values of insulation installed in or on roof/ceiling, walls, foundation (slab, basement wall, crawlspace and/or floor) and ducts outside confined spaces; and U-factors for fenestrations. In the event there is more than one value for each component, the certificate shall list the type and efficiency of heating, cooling, and service water heating equipment. The certificate will be provided by the Kingsport Building Division for all new single-family dwelling projects and may be picked up with the permit.

N1103.1 At least one thermostat shall be installed for each separate heating and cooling system.

N1103.1.1 Heat pumps having supplementary electric-resistance heat shall have controls that, except during defrost, prevent supplementary heat operation when the heat pump compressor can meet the heating load.

N1103.2.1 Supply and return ducts shall be insulated to a minimum of R-8. Ducts in floor trusses shall be insulated to a minimum R-6.

Exception: Ducts or portions there of located completely inside the building thermal envelope.

N1103.2.2 Ducts, air handlers, filter boxes, and building cavities used as ducts shall be sealed.

N1103.2.3 Building framing cavities shall not be used as supply ducts.

M1601.3.1 Joints of duct systems shall be made substantially airtight by means of tapes, mastics, gasketing or other approved closure systems. Closure systems used with rigid fibrous glass ducts shall comply with UL 181A and shall be marked “181 A-P” for pressure-sensitive tape, “181 A-M” for mastic or “181 A-H” for heat-sensitive tape. Closure systems used with flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked “181B-FX” for pressure-sensitive tape or “181B-M” for mastic. Duct connections to flanges of air distribution system equipment or sheet metal fittings shall be mechanically fastened. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B and shall be marked “181B-C”. Crimp joints for round metal ducts shall have a contact lap of at least 1 ½ inches (38 mm) and shall be mechanically fastened by means of at least three sheet-metal screws or rivets equally spaced around the joint.