



Chris Christie  
Governor

Kim Guadagno  
Lt. Governor

State of New Jersey  
Department of Community Affairs  
Division of Codes and Standards  
PO Box 802  
Trenton, New Jersey 08625-0802



Lori Grifa  
Commissioner

BULLETIN NO.

11-1

Date: **January 2011**  
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Subject: **Energy Subcode Compliance**  
Reference: N.J.A.C. 5:23-2.15(f)1.vi,  
**2.18(b) and 3.18**

The Uniform Construction Code requires applicants to show compliance with the Energy Subcode as part of the permit application process for a newly-constructed building or an addition; rehabilitated buildings must meet the requirements under N.J.A.C. 5:23-6, Rehabilitation Subcode.

*Note: Buildings not heated or cooled do not have to meet the Energy Subcode.*

Compliance methods vary dependent on climate zone and building type. The Energy Subcode separates the State into two climates zones as follows:

Zone 4A – Atlantic, Burlington, Camden, Cape May, Cumberland, Essex, Gloucester, Hudson, Middlesex, Monmouth, Ocean, Salem and Union counties;

Zone 5A – Bergen, Hunterdon, Mercer, Morris, Passaic, Somerset, Sussex and Warren counties.

The Energy Subcode divides buildings into two categories: low-rise residential and commercial, which includes all buildings that are not low-rise residential.

**PERMIT APPLICATION/PLAN REVIEW**

*The following is a description of the alternatives for documenting energy subcode compliance at the time of permit application.*

**Low-rise residential buildings** are defined as one- and two-family dwellings or multiple-family buildings three stories or less in height. Compliance must be in accordance with the Energy Subcode and the 2009 International Energy Conservation Code (IECC), and for low-rise residential buildings, may be demonstrated in one of four ways:

**1. COMPLIANCE WITH CALCULATIONS:** This has been the traditional way that compliance with energy codes has been shown. It involves calculating the “U” value (thermal transmittance) of the various building components (walls, floors, roofs, etc.) and showing that they are less than the code-specified maximum for

BULLETIN

the components. Guidance on how to perform the calculations can be found in the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE) Handbook of Fundamentals.

**2. COMPLIANCE WITH RESCHECK SOFTWARE:** The software program performs the calculations based on input about the shape and size of the building, the type of insulation and windows and the type of equipment that the applicant proposes to use. The software is available as a free download from the website: <http://www.energycodes.gov>. The 2009 IECC version of the software should be used and can be selected under “Code” in the menu bar at top. The software simply requires the input of the areas of the various components, the R value of insulation, and the U value of windows and doors. Based on Section 402.1.4, entitled “Total UA alternative,” the software automatically gives trade-offs. A compliance report is generated by the software program, which is to be submitted with the permit application. It must meet or exceed the 2009 IECC (“passes”) based on the applicable climate zone location specified for each municipality.

*Note: REScheck is the software most commonly used to demonstrate compliance with the energy subcode. However, the US Department of Energy does list other building energy software tools that can be used in lieu of REScheck as long as the tool chosen determines compliance with the provisions of the 2009 IECC, specifically the building envelope and HVAC requirements. These tools can be found at [http://apps1.eere.energy.gov/buildings/tools\\_directory/](http://apps1.eere.energy.gov/buildings/tools_directory/) by clicking on the “Codes and Standards” link under the “Tools by Subject” heading on the left-hand side of the webpage.*

**3. COMPLIANCE WITH NJ ENERGY STAR HOMES:** This program is sponsored by the New Jersey Board of Public Utilities through its Clean Energy Program (see <http://www.njenergystarhomes.com>). The program provides incentives and technical assistance for projects that exceed the Energy Subcode. A letter of enrollment (typically the “builder’s acknowledgment” letter) from the New Jersey Energy Star Homes program “market manager” should be submitted with the permit application if the applicant is choosing this compliance option. Inspections for this program are handled by Home Energy Rating company, except that Section 403, entitled “Systems,” of the 2009 IECC must be verified by the local construction office. Upon application for a new home’s Certificate of Occupancy, the Energy Star Home verification summary (i.e. passing final inspection report) should be submitted.

**4. COMPLIANCE WITH PRESCRIPTIVE PACKAGE:** Previous adoptions of the energy subcode allowed for the use of a prescriptive package based on climate zone location and window-to-wall ratios. Following are the applicable portions of Table 402.1.1 of the 2009 IECC that can be applied as a prescriptive package. The applicant need only identify that he/she is using the prescriptive package and then show the corresponding details on the plans. If a proposed building has U factors (a measure of the windows’ efficiency) that are equal to or lower than the values found on the appropriate line in the chart, and R values that are equal to or higher than those listed in the chart, the building complies.

INSULATION & FENESTRATION REQUIREMENTS BY COMPONENT <sup>a</sup>									
Climate Zone	Fenestration U-Factor <sup>b</sup>	Skylight U-Factor <sup>b</sup>	Ceiling R-Value	Wood Frame Wall R-Value	Mass Wall R-Value <sup>i</sup>	Floor R-Value	Basement Wall R-Value <sup>c</sup>	Slab R-Value <sup>d</sup> & Depth	Crawl Space Wall R-Value <sup>e</sup>
4	0.35	0.6	38	13	5/10	19	10/13	10, 2 ft	10/13
5	0.35	0.6	38	20 or 13+5 <sup>h</sup>	13/17	30 <sup>g</sup>	10/13	10, 2 ft	10/13

a. R-values are minimums. U-factors are maximums. R-19 batts compressed into a nominal 2 × 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. (Compressed R-values should be obtained from the manufacturer.)

b. The fenestration U-factor column excludes skylights. In addition, the corresponding solar heat gain coefficient (SHGC) column has been removed from this table as NJ has no requirements (NR) for SHGC.

c. "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.

e. Or insulation sufficient to fill the framing cavity, R-19 minimum.

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, insulated 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.

i. The second R-value applies when more than half the insulation is on the interior of the mass wall.

*Note: Table 402.1.1 applies to typical wood-framed construction. Steel-framed construction equivalents are different and may be found in Table 402.2.5 of the 2009 IECC.*

Regardless of the compliance method chosen, the documentation must be signed and sealed by a design professional, except that in Class 3 buildings as described at N.J.A.C. 5:23-4.3A(d), the documentation may be signed by the mechanical contractor, and in the case of a single-family detached dwelling where the homeowner resides or intends to reside in the dwelling, the homeowner may sign the energy code compliance documentation.

**Commercial buildings** are defined as all buildings other than low-rise residential buildings. Compliance must be in accordance with the Energy Subcode and 2007 ASHRAE Standard 90.1, and for commercial buildings, may be demonstrated in one of two ways:

- 1. COMPLIANCE WITH CALCULATIONS:** This is very much like the calculations for low-rise residential buildings mentioned above. However, the applicant must also provide information on the type of lighting installed and its usage.
- 2. COMPLIANCE WITH COMCHECK SOFTWARE:** This is very much like the REScheck software mentioned above. However, the applicant must also include the type of lighting installed and its usage. The COMCHECK software is available as a free download from the website: <http://www.energycodes.gov>. The 2007 ASHRAE Standard 90.1 version of the software should be used and can be selected under "Code" in the menu bar at top. A compliance report is generated by the software program, which is to be submitted with the permit application. It must meet or exceed the 2007 ASHRAE ("passes") based on the applicable climate zone location.

BULLETIN NO.

11-1

BULLETIN

*Note: COMcheck is the software most commonly used to demonstrate compliance with the energy subcode. However, the US Department of Energy does list other building energy software tools that can be used in lieu of COMcheck as long as the tool chosen determines compliance with the provisions of the 2007 ASHRAE Standard 90.1, specifically the building envelope, lighting, HVAC, and service water heating requirements. These tools can be found at [http://apps1.eere.energy.gov/buildings/tools\\_directory/](http://apps1.eere.energy.gov/buildings/tools_directory/) by clicking on the “Codes and Standards” link under the “Tools by Subject” heading on the left-hand side of the webpage.*

Regardless of the compliance method chosen, the documentation must be signed and sealed by a design professional, except that in Class 3 buildings as described at N.J.A.C. 5:23-4.3A(d), the documentation may be signed by the mechanical contractor.

### INSPECTION

*Work done in **low-rise residential buildings** is inspected to verify:*

- (1) The insulation specified on the plans is the insulation installed,*
- (2) The sealing (air tightness) of the building thermal envelope (this may be done through either a visual inspection or a blower door test), and*
- (3) Effective January 1, 2013, duct tightness through an air leakage test.*

*A further explanation of these inspection responsibilities follows.*

**Insulation** — N.J.A.C. 5:23-2.18(b)1iv(1)(C) requires inspectors to verify that the insulation levels installed match the ones: (a) used in the calculations, (b) found in the REScheck printout, or (c) shown in the Prescriptive Package table. The one exception to inspector verification of the insulation levels is a home enrolled in the NJ Energy Star Homes Program where compliance is verified by a third party. In all cases, other Energy Subcode requirements, such as piping and ductwork insulation, still apply. With specific regard to ductwork, supply ducts in attics are to be insulated to a minimum of R-8 when outside the building thermal envelope, and all other ducts outside the building thermal envelope, to a minimum of R-6.

**Sealing** — Previous editions of the energy subcode were not specific in the requirements for sealing of the building thermal envelope and ductwork. With the adoption of the 2009 IECC, new and specific sealing requirements have been added. To differentiate from the past editions of the Energy Subcode, the word “tightness” is used along with sealing.

- **Building Thermal Envelope tightness** — The permit holder has two options for verifying building thermal envelope tightness: (1) testing per Section 402.4.2.1, or (2) visual inspection per Section 402.4.2.2. Because inspectors are already looking at the type of insulation installed, the visual inspection (option #2) will have already been partially completed; the

remaining inspection issues for envelope tightness relate to the air barrier. If the permit holder chooses testing, the documentation showing the results of the blower door test will become part of the permit file. If the permit holder chooses a visual inspection, the code official will field-verify that the building thermal envelope tightness complies with Table 402.4.2. The air barrier inspection may be performed by a person other than the local code official, but that person must be independent of the installer and approved by the code official. The IECC establishes no credentials for persons performing these inspections. In all cases where the inspection option is used to document compliance, UCC-F395, the Air Barrier and Insulation checklist (attached hereto) must be completed. Once completed, checklists documenting visual inspection(s) as described below, are retained in the file.

- UCC inspector(s) – One checklist documenting both insulation and air barrier requirements have been met is filed.
- UCC inspector(s) and independent inspector(s) – In this case, there may be two checklists filed, one for the insulation completed by the UCC inspector(s), and one for the air barrier completed by the independent inspector(s).
- UCC inspector(s) and blower door test – Here, one checklist for insulation completed by the UCC inspector(s) is filed, and documentation of a passing blower door test is appended to the checklist.
- Duct tightness — *Starting January 1, 2013*, duct tightness must be verified by way of a leakage test unless the air handler and all ducts are located within conditioned space. The permit holder may verify duct tightness through testing either at post-construction or during rough-in; the timing of this test is the permit holder’s choice. The benefit to a post-construction test is that the qualifications for passing are less stringent than a rough-in test. The benefit to a rough-in test is that the ductwork should be much more accessible to fix if it does not pass. The requirements for passing can be found at Section 403.2.2. Again, a copy of the test results will become part of the permit file. The IECC establishes no credentials for persons performing this test.

**Certificate** — As per Section 401.3 of the 2009 IECC, a permanent certificate is to be posted on or in the electrical distribution panel for low-rise residential buildings. The certificate is not to cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels.

The certificate (attached hereto) is to be completed by the builder or registered design professional and is to list the applicable, predominant building thermal envelope properties along with the type and efficiencies of heating, cooling and service water heating equipment installed. In lieu of the certificate provided, a certificate from REScheck or NJ Energy Star Homes is acceptable.

BULLETIN NO.

11-1

BULLETIN

BULLETIN NO.

11-1

# BULLETIN

NJ IECC/2009 Energy Efficiency Certificate for Low-rise Residential Dwellings*		
Address:		Permit #:
<i>Insulation Rating</i> <small>(batt, spray, blown, continuous, other)</small>		<i>R-value</i>
Ceiling/Roof		
Above Grade Wall: framed <input type="checkbox"/> mass <input type="checkbox"/>		
Floor: over unconditioned space <input type="checkbox"/> ; slab <input type="checkbox"/>		
Crawlspace Wall		
Foundation/Basement Wall		
Ductwork (unconditioned spaces)		
<i>Fenestration Rating</i>		<i>U-factor</i> <i>SHGC</i>
Window		
Skylight		
Door		
<i>Heating &amp; Cooling Equipment</i>	<i>Type</i> <small>(Oil, Gas, Electric, other)</small>	<i>Efficiency</i> <small>(AFUE, EER/SEER, HSPF, other)</small>
Furnace		
Heatpump		
Boiler		
Cooling System		
Water Heater		
Other		
<i>Renewables (type of system)</i>		
<i>Other Energy Efficiency Equipment</i>		
<i>Builder or Design Professional Certification</i>		
Name:		Date:
Registration/License Number:		
<i>Comments</i>		
* This is a generic certificate and some items listed above may not be applicable to this specific design when initially constructed; please leave those items blank.		

The inspection of work done in **commercial buildings** has not changed. The inspection includes, but is not limited to, verifying that:

- (1) The insulation specified on the plans is the insulation installed,
- (2) The lighting fixtures and associated controls specified on the plans are installed, and
- (3) The mechanical systems, associated controls and associated insulation specified on the plans are installed.

## AIR BARRIER AND INSULATION CHECKLIST

In the checklist below, **AB** and **I** stand for the *air barrier* and *insulation* inspection components to be verified. The local code official will always verify the **I** components. In the case where the local code official is not verifying the **AB** components, they may be verified by a person independent of the insulation installer, or by the use of a blower door test.

If the permit holder has elected use of a blower door test, documentation of test results verifying air leakage less than 7 air changes per hour when tested at a pressure of 33.5 psf or 50 Pa shall be submitted with this checklist. A passing test demonstrates that the **AB** components are verified.

COMPONENT	CRITERIA	Y, N, OR N/A	COMMENTS	INITIALS	DATE
<b>Floors (including above-garage and cantilevered floors)</b>					
General	I	Insulation is installed to maintain permanent contact with underside of subfloor decking.			
	AB	Air barrier is installed at any exposed edge of insulation.			
Rim joists	AB	Rim joists include an air barrier.			
	I	Rim joists are insulated.			
<b>Walls</b>					
General	I	Corners and headers are insulated.			
	AB	Junction of foundation and sill plate is sealed.			
Crawl space walls	I	Insulation is permanently attached to walls.			
	I	Exposed earth in unvented crawl spaces is covered with Class I vapor retarder with overlapping joints taped.			
Windows and doors	AB	Space between window/door jambs and framing is sealed.			
Garage separation	AB	Air sealing is provided between the garage and conditioned spaces.			
Plumbing and wiring	I	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	I	Showers and tubs on exterior walls have insulation.			
	AB	Showers and tubs on exterior walls have an air barrier separating them from the exterior wall.			
Electrical/phone box on exterior walls	AB	Air barrier extends behind boxes or air sealed-type boxes are installed.			
Common wall	AB	Air barrier is installed in common wall between dwelling units.			
Fireplace	AB	Fireplace walls include an air barrier.			

PERMIT # \_\_\_\_\_

LOT: \_\_\_\_\_ BLOCK: \_\_\_\_\_

COMPONENT		CRITERIA	Y, N, OR N/A	COMMENTS	INITIALS	DATE
<b>Ceiling/Attic</b>						
General	AB	Air barrier in any dropped ceiling/soffit is substantially aligned with insulation and any gaps are sealed.				
	AB	Attic access (except unvented attic), knee wall door, or drop down stair is sealed.				
Recessed lighting	I	Recessed light fixtures penetrating the thermal envelope are air tight, IC-rated, and sealed to drywall.				
<b>Other/All</b>						
Air barrier and thermal barrier	I	Exterior thermal envelope insulation for framed assemblies is installed in substantial contact and continuous alignment with building envelope air barrier.				
	AB	Breaks or joints in the air barrier are filled or repaired.				
	AB	Air-permeable insulation is not used as a sealing material.				
	AB	Air-permeable insulation is inside of an air barrier.				
Shafts, penetrations	AB	Duct shafts, utility penetrations, knee walls and flue shafts opening to exterior or unconditioned space are sealed.				
Narrow cavities	I	Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed/blown insulation.				
HVAC register boots	AB	HVAC register boots that penetrate building envelope are sealed to subfloor or drywall.				

CODE OFFICIAL: _____	SIGNATURE: _____	DATE: _____
CODE OFFICIAL: _____	SIGNATURE: _____	DATE: _____
CODE OFFICIAL: _____	SIGNATURE: _____	DATE: _____
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