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BULLETIN 22-1

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Subject: Energy Subcode Compliance

Reference: N.J.A.C. 5:23-2.15(f)1vi, 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. Buildings undergoing a repair, renovation, alteration, reconstruction or change of use must only meet the requirements provided for at N.J.A.C. 5:23-6, the Rehabilitation Subcode.

Note: "Low-energy" buildings, or portions thereof (thermal separation required), do not have to meet the Thermal Envelope portion of the Energy Subcode. This includes the following buildings:

1. *Those with a peak design rate of energy usage less than 3.4 Btu/h*ft^2 or 1.0 watt/ft^2 of floor area for space conditioning purposes; or*
2. *Those that do not contain conditioned space.*

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, Mercer, Middlesex, Monmouth, Ocean, Salem and Union counties;
Zone 5A – Bergen, Hunterdon, 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 residential portion of the International Energy Conservation Code (IECC-R), which parallels Chapter 11 of the International Residential Code (IRC-N). For purposes of this bulletin, IECC-R references will be made. Compliance for low-rise residential buildings, may be demonstrated in one of the following 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 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. *(Tip: For building thermal envelope, use Zones 4A and 5A from Table R402.1.3, as applicable, as your starting point for the initial input values.)*

2. 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 R402.1.3 of the IECC-R 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[a] *(Reflects errata from Ch. 4 of the 2021 IECC-R, https://www.iccsafe.org/errata-central/)*		
Component / Climate Zone	4A	5A
Fenestration U-Factor[b]	0.30	0.30
Skylight U-Factor[b]	0.55	0.55
Glazed Fenestration SHGC[b]	0.40	0.40
Ceiling R-Value	60	60
Wood Frame Wall R-Value[g]	30 or 20+5ci[h] or 13+10ci[h] or 0+20ci[h]	30 or 20+5ci[h] or 13+10ci[h] or 0+20ci[h]
Mass Wall R-Value[h]	8/13	13/17
Floor R-Value	19	30
Basement Wall R-Value[c, g]	10ci or 13	15ci or 19 or 13+5ci
Slab R-Value & Depth[d]	10ci, 4 ft	10ci, 4 ft
Crawl Space Wall R-Value[c, g]	10ci or 13	15ci or 19 or 13+5ci
a. R-values are minimums. U-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed R-value of the insulation shall be not 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.		
c. "5ci or 13" means R-5 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "10ci or 13" means R-10 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "15ci or 19 or 13 + 5ci" means R-15 continuous insulation (ci) on the interior or exterior surface of the wall; or R-19 cavity insulation on the interior side of the wall; or R-13 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or exterior surface of the wall.		
d. R-5 insulation shall be provided under the full slab area of a heated slab in addition to the required slab edge insulation R-value for slabs. as indicated in the table. The slab-edge insulation for heated slabs shall not be required to extend below the slab.		
g. The first value is cavity insulation; the second value is continuous insulation. Therefore, as an example, "13 + 5" means R-13 cavity insulation plus R-5 continuous insulation.		
h. Mass walls shall be in accordance with Section N1102.2.5. The second R-value applies where more than half of the insulation is on the interior of the mass wall.		

Note: Table R402.1.3 applies to typical wood-framed construction; equivalent U-factors may be found in Table R402.1.2. Steel-frame equivalent R-values may be found in Table R402.2.6.

3. COMPLIANCE WITH RESCHECK-web: The online 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 program is available at http://www.energycodes.gov; you must create a username and password. The IECC-R version of the program should be used and can be selected under "Code" in the menu bar at top. The program simply requires the input of the areas of the various components, the R-value of insulation, and the U-factor of windows and doors. Based on

Section R402.1.5, entitled “Total UA alternative,” the program automatically gives trade-offs. A compliance report is generated by the program, which is to be submitted with the permit application. It must meet or exceed the IECC-R (“passes” by zero percent or better) based on the applicable climate zone location specified for each municipality. *(Tip: For building thermal envelope, use Zones 4A and 5A from Table 401.2.3, as applicable, as your starting point for the initial input values.)*

Note: REScheck-web is most commonly used to demonstrate compliance with the energy subcode. However, the US Department of Energy does list other building energy software and online tools that can be used in lieu of REScheck as long as the tool chosen determines compliance with the provisions of the IECC-R, specifically the building envelope and HVAC requirements. These tools can be found at http://www.buildingenergysoftwaretools.com.

4. COMPLIANCE WITH CLEAN ENERGY PROGRAM FOR RESIDENTIAL NEW CONSTRUCTION (FORMERLY NJ ENERGYSTAR HOMES): This program is sponsored by the New Jersey Board of Public Utilities through its Clean Energy Program (see http://www.njcleanenergy.com/residential). The program provides incentives and technical assistance for projects that exceed the Energy Subcode and complies with Section R102.1.1, Above code programs. A letter of enrollment (typically the “builder’s acknowledgment” letter) from the NJ Clean Energy 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 R403, entitled “Systems,” of the IECC-R must be verified by the local construction office. Upon application for a new home’s Certificate of Occupancy, the program’s verification summary (i.e. passing final inspection report) should be submitted.

Regardless of the compliance method chosen above, an ***additional energy efficiency package*** is required for new construction other than additions. At least one package from Section R408 must be included for compliance:

- Enhanced envelope performance option;
- More efficient HVAC equipment performance option;
- Reduced energy use in service water-heating option;
- More efficient duct thermal distribution system option; or
- Improved air sealing and efficient ventilation system option.

5. OTHER COMPLIANCE OPTIONS: Total Building Performance Option, R405; Energy Rating Index Option, R406.

In addition, ***compliance 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 and sealed by the HVACR 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 ASHRAE Standard 90.1; do not use the commercial portion of the International Energy Conservation Code (IECC-C) as it is deleted per N.J.A.C. 5:23-3.18. Compliance for commercial buildings may be demonstrated in one of the following 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. (*Tip: For building thermal envelope, use Tables 5.5-4 and 5.5-5, as applicable, as your starting point for the initial input values.)*

2. COMPLIANCE WITH COMCHECK-web: This is very much like the online REScheck program mentioned above. However, the applicant must also include the type of lighting installed and its usage. COMCHECK is available at http://www.energycodes.gov; you must create a username and password. The ASHRAE Standard 90.1 version of the program should be used and can be selected under "Code" in the menu bar at top. A compliance report is generated by the online program, which is to be submitted with the permit application. It must meet or exceed the ASHRAE ("passes" by zero percent or better) based on the applicable climate zone location*. (Tip: For building thermal envelope, use Tables 5.5-4 and 5.5-5, as applicable, as your starting point for the initial input values.)*

Note: COMcheck-web is most commonly used to demonstrate compliance with the energy subcode. However, the US Department of Energy does list other building energy software and online tools that can be used in lieu of COMcheck as long as the tool chosen determines compliance with the provisions of the ASHRAE Standard 90.1, specifically the building envelope, lighting, HVAC, and service water heating requirements. These tools can be found at http://www.buildingenergysoftwaretools.com.

3. OTHER COMPLIANCE OPTIONS: Energy Cost Budget Method, Chapter 11; Performance Rating Method, Appendix G.

Compliance 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 and sealed by the HVACR 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 it to be done through a visual inspection and a blower door test), and
(3) 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) shown in the Prescriptive Package table or (c) found in the REScheck printout. The one exception to inspector verification of the insulation levels is a home enrolled in the NJ Clean Energy 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 (Section R403.3):

- *Ducts located outside conditioned space*. Supply and return ducts located outside conditioned space are to be insulated to an R-value of not less than R-8 for ducts 3 inches (76 mm) in diameter and larger and not less than R-6 for ducts smaller than 3 inches (76 mm) in diameter. (*For ductwork to be considered inside a conditioned space, compliance with Section R403.3.2 is required.*)

Sealing — Specific air leakage sealing requirements within the IECC-R are as follows:

- *Building Thermal Envelope tightness*. Air leakage, or tightness, is to be verified in two ways: (1) visual inspection per Section R402.4.1.1 and (2) testing per Section R402.4.1.2. UCC inspectors will already be inspecting for the type/location of insulation installed and some air barrier items, so a visual inspection will be partially completed. Items inspected by the enforcing agency and the remaining items are also to be verified by a person independent of the installer (i.e. third party) and approved by the code official. Verification will also require documentation showing the results of the blower door test conducted in accordance with ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827 by a person independent of the installer (i.e. third party) and approved by the code official. This will become part of the permit file and will further demonstrate compliance. In other words, a UCC code inspector(s) will field-verify that the building thermal envelope tightness complies with Table R402.4.1.1, an independent party will verify the same and testing will be documented by an independent party meeting Section R402.4.1.2. The IECC-R establishes no credentials for persons performing these inspections and both third parties can be the same person/company. In all cases, compliance documentation will include UCC-F392, the Air Barrier and Insulation checklist.
    - Exception: Testing for additions is not required provided the visual inspection is complete as indicated above.
- *Duct tightness*. Duct tightness must be verified by way of a leakage test regardless of location. 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 testing and passing criteria can be found at Section R403.3.5 and R403.3.6. Again, a copy of the test results will become part of the permit file. The IECC-R establishes no credentials for persons performing this test.
    - Note that Section R403.3.7 does not permit the usage of framing cavities (e.g. stud wall cavities, space between solid floor joists) to be used as ducts or plenums for supply or return air.

Certificate — As per Section R401.3 of the IECC-R, a permanent certificate is to be 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 (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 Clean Energy Program is acceptable.

NJ IECC/2021 Energy Efficiency Certificate for Low-rise Residential Dwellings*			
Address:		Permit #:	
Insulation Rating *(batt, spray, blown, continuous, other)*		*R-value*	
Ceiling/Roof			
Above Grade Wall: framed__; mass__			
Floor: over unconditioned space__; slab__			
Crawlspace Wall			
Foundation/Basement Wall			
Ductwork (unconditioned spaces)			
Fenestration Rating		*U-factor*	*SHGC*
Window			
Skylight			
Door			
Heating & Cooling Equipment	*Type* *(Oil, Gas, Electric, other)*	*Efficiency* *(AFUE, EER/SEER, HSPF, other)*	
Furnace			
Heatpump			
Boiler			
Cooling System			
Water Heater			
Other			
Renewables (type of system)			
Additional Energy Efficiency Package/Other Equipment			
Builder or Design Professional Certification			
Name: Date:			
Registration/License Number:			
Comments			
** 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.

PERMIT #: _____ **AIR BARRIER and INSULATION CHECKLIST** LOT: _____ BLOCK: _____

In the checklist below, AB and II stand for the air barrier and insulation inspection components to be verified. The local code official will always verify the II components. In the case where the local code official is not able to verify the AB components, they are to be verified by a person independent of the insulation installer. See second page for testing documentation.

			Verification Initials[1]		
COMPONENT	AIR BARRIER (AB) CRITERIA	INSULATION INSTALLATION (II) CRITERIA	AB	II	Comments
General requirements	* A continuous air barrier shall be installed in the building envelope. * Breaks or joints in the air barrier shall be sealed.	* Air-permeable insulation shall not be used as a sealing material.			
Ceiling/attic	* The air barrier in any dropped ceiling or soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed. * Access openings, drop-down stairs or knee wall doors to unconditioned attic spaces shall be sealed.	* The insulation in any dropped ceiling/soffit shall be aligned with the air barrier.			
Walls	* The junction of the foundation and sill plate shall be sealed. * The junction of the top plate and the top of exterior walls shall be sealed. * Knee walls shall be sealed.	* Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance, R-value, of not less than R-3 per inch. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.			
Windows, skylights and doors	* The space between framing and skylights, and the jambs of windows and doors, shall be sealed.	--			
Rim joists	* Rim joists shall include an exterior air barrier. * The junctions of the rim board to the sill plate and the rim board and the subfloor shall be air sealed.	* Rim joists shall be insulated so that the insulation maintains permanent contact with the exterior rim board.			
Floors, including cantilevered floors and floors above garages	* The air barrier shall be installed at any exposed edge of insulation.	* Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of subfloor decking. Alternatively, floor framing cavity insulation shall be in contact with the top side of sheathing, or continuous insulation installed on the underside of floor framing and extending from the bottom to the top of all perimeter floor framing members.			
Basement crawl space, and slab foundations	* Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder/air barrier. * Penetrations through concrete foundation walls and slabs shall be air sealed. * Class 1 vapor retarders shall not be used as an air barrier on below-grade walls.	* Crawl space insulation, where provided instead of floor insulation, shall be installed. * Conditioned basement foundation wall insulation shall be installed. * Slab-on-grade floor insulation shall be installed			
Shafts, penetrations	* Duct and flue shafts and other similar penetrations to exterior or unconditioned space shall be sealed to allow for expansion, contraction and mechanical vibration.	* Insulation shall be fitted tightly around utilities passing through shafts and penetrations in the building thermal envelope to maintain required R-value.			

			Verification Initials[1]		
COMPONENT	AIR BARRIER (AB) CRITERIA	INSULATION INSTALLATION (II) CRITERIA	AB	II	Comments
	* Utility penetrations of the air barrier shall be caulked, gasketed or otherwise sealed and shall allow for expansion, contraction of materials and mechanical vibration.				
Narrow cavities	* Narrow cavities of 1 inch or less that are not able to be insulated shall be air sealed.	* Batts to be installed in narrow cavities shall be cut to fit or narrow cavities shall be filled with insulation that on installation readily conforms to the available cavity space.			
Garage separation	* Air sealing shall be provided between the garage and conditioned spaces.	* Insulated portions of the garage separation assembly shall be installed			
Recessed lighting	* Recessed light fixtures installed in the building thermal envelope shall be air sealed.	* Recessed light fixtures installed in the building thermal envelope shall be airtight and IC rated, and shall be buried or surrounded with insulation.			
Plumbing, wiring or other obstructions	* All holes created by wiring, plumbing or other obstructions in the air barrier assembly shall be air sealed.	* Insulation shall be installed to fill the available space and surround wiring, plumbing, or other obstructions, unless the required R-value can be met by installing insulation and air barrier systems completely to the exterior side of the obstructions.			
Shower/tub on exterior wall	* The air barrier installed at exterior walls adjacent to showers and tubs shall separate the wall from the shower or tub.	* Exterior walls adjacent to showers and tubs shall be insulated.			
Electrical/phone box on exterior walls	* The air barrier shall be installed behind electrical and communication boxes. Alternatively, air-sealed boxes shall be installed.	--			
HVAC register boots	* HVAC supply and return register boots that penetrate building thermal envelope shall be sealed to the subfloor, wall covering or ceiling penetrated by the boot.	--			
Concealed sprinklers	* Where required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.	--			

1 – In the case that verification is not applicable, "N/A" shall be used as the initials.

CODE OFFICIAL: _____ SIGNATURE: _____ DATE: _____

CODE OFFICIAL: _____ SIGNATURE: _____ DATE: _____

CODE OFFICIAL: _____ SIGNATURE: _____ DATE: _____

NAME & COMPANY: _____ SIGNATURE: _____ DATE: _____

NAME & COMPANY: _____ SIGNATURE: _____ DATE: _____

NAME & COMPANY: _____ SIGNATURE: _____ DATE: _____

For new construction other than an addition, documentation of test results verifying air leakage less than 3 air changes per hour when tested per ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 w.g. (50 Pa) shall be submitted with this checklist.

NAME & COMPANY: _____ SIGNATURE: _____ DATE: _____