

## **2018 NC State Energy Conservation Code Amendments**

**(adopted December 2017 through March 2023)**

**(Note: includes identified NC Errata)**

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The following pages represent a summary of the Building Code Council adopted amendments that have been approved by the Rules Review Commission or by legislative review pursuant to N.C.G.S. 150B-21.3.

2018 NC Energy Conservation Code (based on the 2015 International Energy Conservation Code) effective 1/1/2019

These amendments revise, delete or add to the adopted NC Energy Code.

2018 NC Energy Code  
Chapter 2 Definitions. (200901 Item B-20)

**AIR-IMPERMEABLE INSULATION.** An insulation having an air permanence equal to or less than 0.02 L/s-m<sup>2</sup> at 75 Pa pressure differential tested according to ASTM E2178 or E283 at the thickness applied.

The delayed effective date of this Rule is January 1, 2022.  
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Energy Conservation Code  
C101.2 Scope. (170613 Item B-8)

**C101.2 Scope.**

This code applies to commercial buildings and the buildings' sites and associated systems and equipment.

**Exceptions:**

1. Energy expended in support of process energy applications does not invoke energy conservation code requirements or building thermal envelope requirements unless otherwise required in specific sections of this code.
2. Per G.S. 143-138 (b18), no energy conservation code provisions shall apply to any structure for which the primary occupancy classification is Group F, S, or U pursuant to Chapter 3 of the 2018 North Carolina Building Code. This exclusion shall apply to the entire building area.

The delayed effective date of this Rule is January 1, 2019.  
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Energy Conservation Code  
C401.2 Application. (191210 Item B-3)

**C401.2 Application**

Commercial buildings shall comply with one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1.
2. The requirements of Sections C402 through C405. In addition, commercial buildings shall comply with Section C406 and tenant spaces shall comply with Section C406.1.1.
3. The requirements of Sections C402.5, C403.2, C404, C405.2, C405.3, C405.5, C405.6 and C407. The building energy cost shall be equal to or less than 85 percent of the standard reference design building.
4. ~~North Carolina specific COMcheck keyed to the 2018 IECC or ASHRAE 90.1—2013 2016 COMcheck~~ shall be permitted to demonstrate compliance with this code.

The delayed effective date of this Rule is January 1, 2021.  
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

March 14, 2023

2018 NC Energy Conservation Code  
C403.2.9 Duct and Plenum Insulation. (221213 Item A-8)

**C403.2.9 Duct and Plenum Insulation and Sealing.**

Supply and return air ducts and plenums shall be insulated with a minimum of R-6 insulation where located in unconditioned spaces inside the building. Where located outdoors, supply and return ducts shall be insulated with a minimum of R-8 insulation in *Climate Zones* 3 and 4 and a minimum of R-12 insulation in *Climate Zone* 5. Where located within a building envelope assembly, such as a wall of the building thermal envelope, the duct or plenum shall be separated from the building exterior or unconditioned space by a minimum of R-8 insulation in *Climate Zones* 3 and 4 and a minimum of R-12 insulation in *Climate Zone* 5.

Commercial Spaces Insulation Rule per N.C. Session Law 2022-6 Section 20.10A.(c) and N.C. Session Law 2022-46 Section 26.(b), expires 3/17/24

Supply and return air ducts located in ventilated or non-ventilated unconditioned spaces, other than attic spaces, shall be insulated with a minimum of R-4.0 insulation in Climate Zones 3 and 4 and a minimum of R-6.0 insulation in Climate Zone 5. Supply and return air ducts located in ventilated or non-ventilated unconditioned attic spaces shall be insulated to a minimum R-6.0.

**Exception:** Where located within equipment.

Ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

This two-year temporary rule expires March 17, 2024.  
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Energy Conservation Code  
R101.2 Scope. (180911 Item B-16)

**R101.2 Scope.**

This code applies to *residential buildings* and the buildings sites and associated systems and equipment.

Exception:

I. In accordance with N.C.G.S. 143-138 (b19), no energy conservation code provisions shall apply to detached and attached garages located on the same lot as a dwelling.

The delayed effective date of this Rule is January 1, 2020.  
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Energy Conservation Code  
R401.2 Application. (191210 Item B-3)

**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 labeled “Mandatory.”
3. An energy rating index (ERI) approach in Section R406.
4. ~~North Carolina specific~~ REScheck keyed to the 2018 IECC shall be permitted to demonstrate compliance with this code. Envelope requirements may not be traded off against the use of high efficiency heating or cooling equipment. No tradeoff calculations are needed for required termite inspection and treatment gaps.

The delayed effective date of this Rule is January 1, 2021.  
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Energy Conservation Code  
R402.1.2, R402.1.4, R&U-Value Tables. (170613 Item B-13)

**The Agency withdrew this item due to RRC February 15, 2018 objection.**  
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

North Carolina General Assembly Session Law 2023-108, Section 6 became law on 8/16/23:

**AMEND INSULATION REQUIREMENTS FOR UNVENTED ATTIC AND ENCLOSED RAFTER ASSEMBLIES**

**SECTION 6.(a)** Definitions. – As used in this section, "Code" means the current North Carolina State Building Code collection, and amendments to the Code, as adopted by the Council. For purposes of this section and its implementation, "R402 Rules" means provisions and tables within Section 402, Building Thermal Envelope, North Carolina – Residential Provisions, of the North Carolina Energy Conversation Code. As used in this section, "Council" means the Building Code Council. On or after January 1, 2025, "Council" means the Residential Code Council as created in Section 1 of this act.

**SECTION 6.(b)** R402 Rules Amendment. – The Council shall amend R402 Rules to include, as an optional alternative to residential ceiling insulation minimums, minimum insulation requirements for the use of air-impermeable insulation in unvented attic and unvented enclosed rafter assemblies. In developing this amendment, the Council shall include in that optional alternative that where R402 Rules require R-38 insulation in the ceiling, installing air-impermeable insulation, as follows, to the underside or directly above the roof deck shall be deemed to satisfy the R-38 requirements: (i) R-20 (equivalent U-factor 0.05) for climate zone 3; (ii) R-25 (equivalent U-factor 0.037) for climate zone 4; and (iii) R-25 (equivalent U-factor 0.037) for climate zone 5. These air-impermeable insulation alternative R-value minimums apply in residences meeting the following criteria:

- (1) The unvented attic or unvented enclosed rafter assemblies are constructed under Section R806.5 of the North Carolina Residential Code.
- (2) The residence contains a mechanical ventilation system that operates on a positive, balanced, or hybrid pressure strategy.
- (3) For residences with air-impermeable insulation installed below the roof deck, exposed portions of the roof rafters are wrapped by a minimum of R-3 insulation unless directly covered by drywall or finished ceiling material. For residences with air-impermeable insulation installed above the roof deck, roof rafters do not require insulation wrapping if air-impermeable insulation installed above the roof deck is continuous.
- (4) The residence obtains an ACH50 blower door test result of less than 3.0.
- (5) The residence contains heating, cooling, and ventilation equipment and ductwork within thermal envelope.

**SECTION 6.(c)** Sunset. – This section expires when permanent rules adopted as required by subsection (b) of this section become effective.

2018 NC Energy Conservation Code

R403.3.1 Insulation (Mandatory). (221213 Item A-8)

**R403.3.1 Insulation (Mandatory).**

Supply and return ducts in unconditioned space and outdoors shall be insulated to a minimum R-8. Supply ducts inside *semi-conditioned space* shall be insulated to a minimum R-4; return ducts inside conditioned and *semi-conditioned space* are not required to be insulated. Ducts located inside conditioned space are not required to be insulated other than as may be necessary for preventing the formation of condensation on the exterior of cooling ducts.

Residential Spaces Insulation Rule per N.C. Session Law 2022-6 Section 20.10 (c) and N.C. Session Law 2022-46 Section 26.(a), expires 3/17/24

Supply and return air ducts located in ventilated or non-ventilated unconditioned spaces, other than attics, shall be insulated to a minimum R-4.2. Supply and return air ducts located in ventilated or non-ventilated unconditioned attic spaces shall be insulated to a minimum R-6.0.

This two-year temporary rule expires March 17, 2024.

The Statutory authority for Rule-making is G. S. 143-136; 143-138.

March 14, 2023

2018 NC Energy Conservation Code  
403.3.3 Duct leakage. (161213 Item B-3.1)

**R403.3.3 Duct leakage (Perspective) and duct testing (Mandatory).** Duct testing and duct leakage shall be verified by compliance with either Section 403.3.3.1 or 403.3.3.2. Duct testing shall be performed and reported by the permit holder, a NC licensed general contractor, a NC licensed HVAC contractor, a NC licensed Home Inspector, a registered design professional, a certified BPI Envelope Professional or a certified HERS rater. A single point depressurization, not temperature corrected, test is sufficient to comply with this provision, provided that the duct testing fan assembly(s) has been certified by the manufacturer to be capable of conducting tests in accordance with ASTM E1554-07.

The duct leakage information, including duct leakage test selected and result, tester name, date and contact information, shall be included on the certificate described in Section 401.3.

For the Test Criteria, the report shall be produced in the following manner: perform the HVAC system air leakage test and record the CFM25. Calculate the total square feet of Conditioned Floor Area (CFA) served by that system. Multiply CFM25 by 100, divide the result by the CFA and record the result. If the result is less than or equal to 5 CFM25/100SF for the “Total duct leakage” test or less than or equal to 4CFM25/100SF for the “Duct leakage to the outside” test, then the HVAC system air tightness is acceptable. Appendix 3C contains optional sample worksheets for duct testing for the permit holder’s use only.

**Exceptions to testing requirements:**

1. Duct systems or portions thereof inside the building thermal envelope shall not be required to be leak tested.
2. Installation of a partial system as part of replacement, renovation or addition does not require a duct leakage test.
3. Duct systems (complete) serving areas of 750 sq. ft. or less shall not need to be required to be leak tested.

The delayed effective date of this Rule is January 1, 2019.

The Statutory authority for Rule-making is G. S. 143-136; 143-138.

(Note: Also printed in the 2018 NC Residential Code N1103.3.3.)

(Note: The remainder is part of the 2018 Code adoption package.)

2018 NC Energy Conservation Code  
R406 Energy Rating Index. (161213 Item B-3.3)

## **SECTION R406 ENERGY RATING INDEX COMPLIANCE ALTERNATIVE**

**R406.1 Scope.** This section establishes criteria for compliance using an Energy Rating Index (ERI) analysis.

### **R406.2 Mandatory requirements.**

Compliance with this section requires that the ~~mandatory~~ provisions identified in Sections ~~R401.2~~ R401 through R404 labeled as “mandatory” ~~and Section R403.5.3~~ be met. The building thermal envelope shall be greater than or equal to levels of efficiency and Solar Heat Gain Coefficient in Table 402.1.1 or 402.1.3 of the ~~2009 International Energy Conservation Code~~ 2012 NC Energy Conservation Code. Minimum standards associated with compliance shall be the ANSI RESNET ICC Standard 301-2014 “Standard for the Calculation and Labeling of the Energy Performance of Low-Rise Residential Buildings using an Energy Rating Index.” A North Carolina *licensed design professional* or certified *HERS rater* is required to perform the analysis if required by North Carolina licensure laws.

**Exception:** ~~Supply and return ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-6. Supply and return ducts in unconditioned space and outdoors shall be insulated to a minimum R-8. Supply ducts inside semi-conditioned space shall be insulated to a minimum R-4; return ducts inside conditioned and semi-conditioned space are not required to be insulated. Ducts located inside conditioned space are not required to be insulated other than as may be necessary for preventing the formation of condensation on the exterior of cooling ducts.~~

### **R406.5 Verification by approved agency.**

Verification of compliance with Section R406 shall be performed by the *licensed design professional* or certified *HERS rater* and the compliance documentation shall be provided to the code official. The code official shall inspect according to the requirements of Section R406.6.2 ~~completed by an approved third party.~~

The delayed effective date of this Rule is January 1, 2019.

The Statutory authority for Rule-making is G. S. 143-136; 143-138.

(Note: All other strikethroughs/underlines are part of the 2018 Code adoption package.)

(Note: certified HERS rater = RESNET Certified Home Energy Rater)

March 14, 2023

2018 NC Energy Code  
R406.2 Mandatory requirements. (200901 Item B-15)

**R406.2 Mandatory requirements.** Compliance with this section requires that the provisions identified in Sections R401 through R404 labeled as “mandatory” be met. The building thermal envelope shall be greater than or equal to levels of efficiency and Solar Heat Gain Coefficient in Table R406.2.1 or Table R406.2.2, Table 402.1.1 or 402.1.3 of the 2012 North Carolina Energy Conservation Code. Minimum standards associated with compliance shall be the ANSI RESNET ICC Standard 301-2014: “Standard for the Calculation and Labeling of the Energy Performance of Low-Rise Residential Buildings using an Energy Rating Index.” A North Carolina *registered design professional* or certified *HERS rater* is required to perform the analysis if required by North Carolina licensure laws.

**Exception:** Supply and return ducts in unconditioned space and outdoors shall be insulated to a minimum R-8. Supply ducts inside semi-conditioned space shall be insulated to a minimum R-4; return ducts inside conditioned and semi-conditioned space are not required to be insulated. Ducts located inside conditioned space are not required to be insulated other than as may be necessary for preventing the formation of condensation on the exterior of cooling ducts.

**TABLE R406.2.1**  
**MINIMUM INSULATION AND FENESTRATION REQUIREMENTS FOR ENERGY RATING INDEX COMPLIANCE<sup>a</sup>**

CLIMATE ZONE	FENESTRATION VALUES			R-VALUES FOR								
	FENESTRATION U-FACTOR <sup>b,j</sup>	SKYLIGHT <sup>b</sup> U-FACTOR	GLAZED FENESTRATION SHGC <sup>b,k</sup>	CEILING <sup>m</sup>	UNVENTED <sup>p</sup> RAFTER ASSEMBLIES IN ATTICS CONTAINING DUCTWORK, AIR-IMPERMEABLE	UNVENTED <sup>p</sup> RAFTER ASSEMBLIES IN ATTICS CONTAINING DUCTWORK, AIR-PERMIABLE/IMPERMEABLE	WOOD FRAME WALL	MASS WALL <sup>l</sup>	FLOOR	BASEMENT <sup>c,o</sup> WALL	SLAB <sup>d</sup>	CRAWL SPACE <sup>c</sup> WALL
3	0.35	0.65	0.3	30	20	15-10 <sup>q</sup>	13	5/10	19	10/13 <sup>f</sup>	0	5/13
4	0.35	0.6	0.3	38 or 30ci <sup>l</sup>	20	15-10 <sup>q</sup>	15, 13+2.5 <sup>h</sup>	5/10	19	10/13	10	10/13
5	0.35	0.6	NR	38 or 30ci <sup>l</sup>	25	15-20 <sup>q</sup>	19 <sup>n</sup> , 13+5 <sup>h</sup> , or 15+3 <sup>h</sup>	13/17	30 <sup>g</sup>	10/13	10	10/13

For SI: 1 foot = 304.8 mm.

a. R-values are minimums. U-factors and SHGC are maximums.

b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.

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 or crawl space wall.

d. For monolithic slabs, insulation shall be applied from the inspection gap downward to the bottom of the footing or a maximum of 18 inches below grade, whichever is less. For floating slabs, insulation shall extend to the bottom of the foundation wall or 24 inches, whichever is less. (See Appendix R2) R-5 shall be added to the required slab edge R-values for heated slabs.

e.- Deleted.

f. Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1.

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

h. The first value is cavity insulation, the second value is continuous insulation so “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.

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



- j. In addition to the exemption in R402.3.3, a maximum of two glazed fenestration product assemblies having a U-factor no greater than 0.55 shall be permitted to be substituted for minimum code compliant fenestration product assemblies without penalty.
- k. In addition to the exemption in R402.3.3, a maximum of two glazed fenestration product assemblies having a SHGC no greater than 0.70 shall be permitted to be substituted for minimum code compliant fenestration product assemblies without penalty.
- l. R-30 shall be deemed to satisfy the ceiling insulation requirement wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. Otherwise, R-38 insulation is required where adequate clearance exists or insulation must extend either to the insulation baffle or within 1" of the attic roof deck.
- m. Table value required except for roof edge where the space is limited by the pitch of the roof; there the insulation must fill the space up to the air baffle.
- n. R -19 fiberglass batts compressed and installed in a nominal 2 × 6 framing cavity is deemed to comply. Fiberglass batts rated R-19 or higher compressed and installed in a 2x4 wall are not deemed to comply.
- o. Basement wall meeting the minimum mass wall specific heat content requirement may use the mass wall R-value as the minimum requirement.
- p. The air-impermeable insulation shall meet the requirements of the definition in Section R202. Air-impermeable insulation shall be installed in direct contact with the underside of the structural roof sheathing. For one- and two-family dwellings and townhouses, the insulation installation shall meet the requirements of R806.5 of the North Carolina Residential Code. For Residential Buildings other than one- and two-family dwellings and townhouses, the insulation installation shall meet the installation requirements of 1203.3 of the North Carolina Building Code. Exposed rafters shall be covered with R-7 insulation.
- q. The value for air-permeable insulation is shown first and that for air-impermeable insulation second. Thus, R-15 + R-10 indicates that the minimum value for air-permeable insulation is R-15, and the minimum value for air-impermeable insulation is R-10. Air-impermeable insulation shall be installed in direct contact with the underside of the structural roof sheathing. The air-permeable insulation shall be installed directly under the air-impermeable insulation. Exposed rafters shall be covered with R-7 insulation.

**TABLE R406.2.2**  
**EQUIVALENT U-FACTORS FOR TABLE R406.2.1<sup>a</sup>**

CLIMATE ZONE	FENESTRATION <sup>d</sup>	SKYLIGHT U-FACTOR	CEILING	UNVENTED <sup>e</sup> RAFTER ASSEMBLIES IN ATTICS CONTAINING DUCTWORK, AIR-IMPERMEABLE	UNVENTED <sup>e</sup> RAFTER ASSEMBLIES IN ATTICS CONTAINING DUCTWORK, AIR-PERMEABLE/IMPERMEABLE	FRAME WALL	MASS WALL <sup>b</sup>	FLOOR	BASEMENT <sup>d</sup> WALL	CRAWL SPACE <sup>c</sup> WALL
3	0.35	0.65	0.0350	0.05	0.043 <sup>f</sup>	0.082	0.141	0.047	0.059	0.136
4	0.35	0.60	0.0300	0.05	0.043 <sup>f</sup>	0.077	0.141	0.047	0.059	0.065
5	0.35	0.60	0.0300	0.037	0.034 <sup>f</sup>	0.061	0.082	0.033	0.059	0.065

- a. Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.
- b. When more than half the insulation is on the interior, the mass wall U-factors shall be a maximum of 0.07 in Climate Zone 3, 0.07 in Climate Zone 4 and 0.054 in Climate Zone 5.
- c. Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure R301.1 and Table R301.1.
- d. A maximum of two glazed fenestration product assemblies having a U-factor no greater than 0.55 and a SHGC no greater than 0.70 shall be permitted to be substituted for minimum code compliant fenestration product assemblies without penalty. When applying this note and using the RESCheck "UA Trade-off" compliance method to allow continued use of the software, the applicable fenestration products shall be modeled as meeting the U-factor of 0.35 and the SHGC of 0.30, as applicable, but the fenestration products' actual U-factor and actual SHGC shall be noted in the comments section of the software for documentation of application of this note to the applicable products. Compliance for these substitute products shall be verified compared to the allowed substituted maximum U-value requirement and maximum SHGC requirement, as applicable.

e. The air-impermeable insulation shall meet the requirements of the definition in section R202. Air-impermeable insulation shall be installed in direct contact with the underside of the structural roof sheathing. For one- and two-family dwellings and townhouses, the insulation installation shall meet the requirements of R806.5 of the North Carolina Residential Code. Exposed rafters shall be covered with R-7 insulation.

f. For air-permeable/ impermeable applications, Table R406.2.1 shall be followed for minimum insulation values.

The delayed effective date of this Rule is January 1, 2022.

The Statutory authority for Rule-making is G. S. 143-136; 143-138.