

TABLE N102.1.2 (R402.1.2)
(2018 EDITION NC RESIDENTIAL CODE)
INSULATION AND PENETRATION REQUIREMENTS BY COMPONENT a

Climate Zone	Penetration U-Factor a, j	Skylight U-Factor	Glazed Penetration SHGC b, h	Ceiling R-Value e	Mood Frame Wall R-Value e	Mass Wall R-Value i	Floors R-Value	Basement ** Wall R-Value	Slab e R-Value & Depth	Crawl Space e Wall R-Value
3	0.35	0.55	0.30	36 or 30 d	15 or 13 + 2.5 h	5/13 or 5/10 e	19	5/13 i	0	5/13
4	0.35	0.55	0.30	36 or 30 d	15 or 13 + 2.5 h	5/13 or 5/10 e	19	10/15	10	10/15
5	0.35	0.55	NR	36 or 30 d	19 e, 13 + 5 h, or 15 + 3 h	13/17 or 13/12.5 d	30 g	10/15	10	10/19

- 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 solar heat gain coefficient (SHGC) column applies to all glazed fenestration.
- c. "10/15" means R-10 continuous insulated sheathing on the interior or exterior of the home or R-5 cavity insulation at the interior of the basement wall or crawl space wall.
- d. R-5 shall be added to the required slab edge R-values for heated slabs. For monolithic slabs, insulation shall be applied from the inspection gap downward to the bottom of the footing or a maximum of 24 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 O)
- e. Deleted.
- f. Basement wall insulation is not required in warm-humid locations as defined by Figure N101.7 and Table N101.7.
- 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 "15+5" mean R-15 cavity insulation plus R-5 continuous insulation. If structural sheathing cover 15 percent or less of the exterior, insulation 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 Section N102.5.5, 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 Section N102.5.5, a maximum of two glazed fenestration product assemblies having a SHGC no greater than 0.10 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 whenever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. Otherwise R-30 insulation is required where adequate clearance exists or insulation must extend to either 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, then the insulation must fill the space up to the air baffle.
- n. R-19 fiberglass batts compressed and installed in the nominal 2x6 framing cavity is deemed to comply. Fiberglass batts rated R-19 or higher compressed and installed in a 2x4 wall is 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.

TABLE N101.7 (R501.7)
(2018 EDITION NC RESIDENTIAL CODE)
NORTH CAROLINA CLIMATE ZONES, MOISTURE REGIMES, AND WARM-HUMID DESIGNATIONS BY COUNTY

KEY: A - Moist, B - Dry, C - Marine.
Absence of moisture designation indicates moisture regime is irrelevant. Asterisk (*) indicates warm-humid location.

4A Alamance	4A Franklin	5A Pamlico
4A Alexander	5A Gaston	5A Pasquotank
5A Alleghany	4A Gates	5A Pender*
5A Anson	4A Graham	5A Perquimans
5A Ashe	4A Granville	4A Person
5A Avery	5A Greens	5A Pitt
5A Beaufort	4A Guilford	4A Polk
4A Bertie	4A Halifax	5A Randolph
5A Bladen	4A Harnett	5A Richmond
5A Brunswick*	4A Haywood	5A Robeson
4A Buncombe	4A Henderson	4A Rockingham
4A Burke	4A Hertford	5A Rowan
5A Cabarrus	5A Hoke	4A Rutherford
4A Caldwell	5A Hyde	5A Sampson
5A Camden	4A Iredell	5A Scotland
5A Carteret*	4A Jackson	5A Stanly
4A Caswell	5A Johnston	4A Stokes
4A Catawba	5A Jones	4A Surry
4A Chatham	4A Lee	4A Swain
4A Cherokee	5A Lenoir	4A Transylvania
5A Chowan	4A Lincoln	5A Tyrrell
4A Clay	4A Macon	5A Union
4A Cleveland	4A Madison	4A Vance
5A Columbus*	5A Martin	4A Wake
5A Craven	4A McDowell	4A Warren
5A Cumberland	5A Mecklenburg	5A Washington
5A Currituck	5A Mitchell	5A Watauga
5A Dare	5A Montgomery	5A Wayne
5A Davidson	5A Moore	4A Wilkes
4A Davis	4A Nash	5A Wilson
5A Duplin	5A New Hanover*	4A Yadkin
4A Durham	4A Northampton	5A Yancey
5A Edgecombe	5A Onslow*	
4A Forsyth	4A Orange	

**TABLE 402.1.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT.**

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b, e}	CEILING R-VALUE ^k	WOOD FRAME WALL R-VALUE ^e	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
3	0.35	0.65	0.30	30	13	5/10	19	10/13 ^r	0	5/13
4	0.35	0.60	0.30	38 or 30 cont. ^j	15, 13+2.5 ^h	5/10	19	10/13	10	10/13
5	0.35	0.60	NR	38 or 30 cont. ^j	19, 13+5, or 15+3 ^{eh}	13/17	30 ^g	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 O) R-5 shall be added to the required slab edge R-values for heated slabs.

e. R-19 fiberglass batts compressed and installed in a nominal 2 x 6 framing cavity is deemed to comply. Fiberglass batts rated R-19 or higher compressed and installed in a 2x4 wall is not deemed to comply.

f. Basement wall insulation is not required in warm-humid locations as defined by Figure N1101.2(1 and 2) and Table N1101.2.

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. 15+3 means R-15 cavity insulation plus R-3 insulated sheathing. 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. 13+2.5 means R-13 cavity insulation plus R-2.5 sheathing.

i. For Mass Walls, the second R-value applies when more than half the insulation is on the interior of the mass wall.

j. 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 to either the insulation baffle or within 1" of the attic roof deck.

k. 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.

**TABLE 402.1.3
EQUIVALENT U-FACTORS.**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR ^d	CRAWL SPACE WALL U-FACTOR ^e
3	0.35	0.65	0.035	0.082	0.141	0.047	0.059	0.136
4	0.35	0.60	0.030	0.071	0.141	0.047	0.059	0.065
5	0.35	0.60	0.030	0.067	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 0.17 in Zone 1, 0.14 in Zone 2, 0.12 in Zone 3, 0.10 in Zone 4 except Marine, and the same as the frame wall U-factor in Marine Zone 4 and Zones 5 through 8.

c. Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure 301.1 and Table 301.2.

d. Foundation U-factor requirements shown in Table 402.1.3 include wall construction and interior air films but exclude soil conductivity and exterior air films. U-factors for determining code compliance in accordance with Section 402.1.4 (total UA alternative) of Section 405 (Simulated Performance Alternative) shall be modified to include soil conductivity and exterior air films.

402.1.3 U-factor alternative. An assembly with a U-factor equal to or less than that specified in Table 402.1.3 shall be permitted as an alternative to the R-value in Table 402.1.1.

402.1.4 Total UA alternative. If the total *building thermal envelope* UA (sum of U-factor times assembly area) is less than or equal to the total UA resulting from using the U-factors in Table 402.1.3 (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table 402.1.1. The UA calculation shall be done using a method consistent with the ASHRAE *Handbook of Fundamentals* and

shall include the thermal bridging effects of framing materials. The SHGC requirements shall be met in addition to UA compliance.

402.2 Specific insulation requirements (Prescriptive)

402.2.1 Ceilings with attic spaces. Ceilings with attic spaces over conditioned space shall meet the insulation requirements in Table 402.1.1.

Exceptions:

- 1) When insulation is installed in a fully enclosed attic floor system, as described