

**305-2-4-.10 RESIDENTIAL ENERGY CODE.** The 2015 International Energy Conservation Code (IECC) as modified below.

(1) **IECC CHAPTER 1 SCOPE AND ADMINISTRATION.**

(a) **SECTION R101 SCOPE AND GENERAL REQUIREMENTS.**

1. **R101.1 Title.** This code shall be known as the International Energy Conservation Code of Alabama, and shall be cited as such. It is referred to herein as "this code."

2. **R101.5.1 Compliance materials.** The Alabama Energy and Residential Codes Board shall approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

(b) **SECTION R102 ALTERNATIVE MATERIALS, DESIGN AND METHODS OF CONSTRUCTION AND EQUIPMENT.**

1. **R102.1.1 Above code programs.** The Alabama Building and Energy Codes Board or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as "mandatory" in Chapter 4 shall be met.

(c) **SECTION R103 CONSTRUCTION DOCUMENTS.**

1. **R103.1 General.**

Construction documents and other supporting data shall be submitted in one or more sets with each application for a permit. The construction documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require necessary construction documents to be prepared by a registered design professional or other certified persons.

**Exception:** The *code official* is authorized to waive the requirements for construction documents or other supporting data if the *code official* determines they are not necessary to be submitted.

**2. N1101.5 (R103.2) Information on construction documents.** Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when approved by the building official. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, as applicable:

1. Insulation materials and their R-values.
2. Fenestration U-factors and SHGCs where applicable.
3. Area-weighted U-factor and SHGC calculations.
4. Mechanical system design criteria.
5. Mechanical and service water heating system and equipment types, sizes and efficiencies.
6. Equipment and system controls.
7. Duct sealing, duct and pipe insulation and location.
8. Air sealing details.

**3. R103.3 Review of documents.**

The *code official* shall review the accompanying construction documents and shall identify the type of energy building construction method to be used as described in this code.

**4. R103.3.1 Submittal of construction documents.**

When the *code official* issues a permit where construction documents are submitted, the construction documents shall not be changed, modified or altered without re-submittals having been prepared and notification to the code official. Work shall be done in accordance with the submitted construction documents.

One set of construction documents shall be retained by the code official for records.

**5. R103.3.2 Previous submittals.**

This code shall not require changes in the construction documents, construction or designated occupancy of a structure for which a lawful permit has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within

180 days after the effective date of this code and has not been abandoned.

**6. R103.3.3 Phased submittals.**

The *code official* shall have the authority to issue a permit for the construction of part of an energy conservation system before the construction documents for the entire system have been submitted, provided adequate information and detailed statements have been filed complying with all pertinent requirements of this code. The holders of such permit shall proceed at their own risk without assurance that the permit for the entire energy conservation system will be granted.

**7. R103.4 Amended construction documents.**

Changes made during construction that are not in accordance to submitted construction documents shall be resubmitted to the code official as an amended set of construction documents.

**8. R103.5 Retention of construction documents.**

One set of submitted construction documents shall be retained by the *code official* for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.

(c) **SECTION R104 INSPECTIONS**

**1. R104.2.1 Footing and foundation inspection. Section Deleted**

**2. R104.2.4 Mechanical rough-in inspection.**

Inspections at mechanical rough-in shall verify compliance as required by the code and approved plans and specifications as to installed HVAC equipment type and size, required controls, system insulation and corresponding R-value, system air leakage control, dampers, whole-house ventilation and minimum fan efficiency.

**Exception:** Systems serving multiple dwelling units shall be inspected in accordance with Section C104.2.4.

(2) **CHAPTER 2 DEFINITIONS.**

(a) **SECTION R202 GENERAL DEFINITIONS.**

**1. SEMI CONDITIONED SPACE.** An unfinished area of the dwelling such as the attic or crawl space that is insulated as to limit or prevent air infiltration and maintain consistent temperatures commensurate with those inside the thermal envelope.

2. **PROJECTION FACTOR.** The ratio of the horizontal depth of an overhang, eave, or permanently attached shading device, divided by the distance measured vertically from the bottom of the fenestration glazing to the underside of the overhang, eave, or permanently attached shading device.

(3) **CHAPTER 3 GENERAL REQUIREMENTS.**

(a) **SECTION R301 CLIMATE ZONES.**

1. **R301.3 International climate zones.** Section Deleted

2. **R301.4 Tropical climate zone.** Section Deleted

(b) **SECTION R302 DESIGN CONDITIONS.**

1. **R302.1 (N1101.9) Interior design conditions.** The interior design temperatures used for heating and cooling load calculations shall be a maximum of 70°F (22° C) for heating and minimum of 75°F (24° C) for cooling.

(c) **SECTION R303 MATERIALS, SYSTEMS AND EQUIPMENT.**

1. **R303.2.1 (N1101.11.1) Protection of exposed foundation insulation.** Section deleted

(4) **CHAPTER 4 RESIDENTIAL ENERGY EFFICIENCY.**

(a) **SECTION R401 GENERAL.**

1. **R401.2.1 (N1101.2.1) Tropical zone.** Section Deleted

(b) **SECTION R402 BUILDING THERMAL ENVELOPE**

1. **R402.2.2.1 (N1102.2.2.1) Semi-conditioned attics.** Where table N1102.1.1 (R402.1.1) requires R-30 or Table N1102.1.3 (R402.1.3) requires a U-factor of 0.035, Sprayed Polyurethane Foam (SPF) with a U-factor of 0.05 or R-value of R-20 shall be deemed equivalent to the provisions in N1102.2.2 (R402.2.2).

2. **R402.2.4 (N1102.2.4) Access hatches and doors.** Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level in accordance with the following insulation values:

Hinged vertical doors shall have a maximum U-Factor of U-0.20 (R-5 minimum)

1. Hatches/scuttle hole covers shall have a maximum U-Factor of U-0.05 (R-19 minimum) and;

2. Pull down stairs shall have a maximum U-Factor of U-0.20 with a minimum of 75 percent of the panel area having (R-5 minimum) insulation.

Access shall be provided to all equipment that prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened, and to provide a permanent means of maintaining the installed R-value of the loose fill insulation.

**3. R402.2.10 (N1102.2.10) Slab on grade floors.**

Section Deleted

**4. R402.2.11 (N1102.2.11) Crawl space walls.** As an alternative to insulating floors over crawl spaces, crawl space walls shall be permitted to be insulated when the crawl space is not vented to the outside. The band joist shall be insulated and air sealed in accordance with Table N1102.4.1.1 (R402.4.1.1). A 3 inch (76mm) inspection/view strip shall be provided immediately below the floor joists to permit inspections for termites. Crawl space wall insulation shall be permanently fastened to the wall and extend downward from the bottom of the inspection/view strip to within 9 inches (229mm) of the finished interior grade adjacent to the foundation wall. Exposed earth in unvented crawl space foundations shall be covered with a continuous Class I vapor retarder in accordance with Section R408 of the International Residential Code. All joints of the vapor retarder shall overlap by 6 inches (153 mm) and shall extend up the stem wall not less than 6 inches (153mm) and shall be attached to the stem wall.

**5. R402.3.2.1 (N1102.3.2.1) Glazed fenestration SHGC exception.** In Climate Zones 2 and 3, permanently shaded vertical fenestration shall be permitted to satisfy the SHGC requirements. The projection factor of an overhang, eave, or permanently attached shading device shall be greater than or equal to the value listed in table N1102.2.3.1 for the appropriate orientation. The minimum projection shall extend beyond each side of the glazing a minimum of 12 inches (0.3m). Each orientation shall be rounded to the nearest cardinal orientation (+/-45 degrees or 0.79 rad) for purposes of calculations and demonstrating compliance.

**6. R402.4.1.1 (N1102.4.1) Installation (Mandatory).**

The components of the building thermal envelope as listed in Table R4002.4.1.1 (Table N1102.4.1.1) shall be installed in accordance with the manufacturer's instructions and the criteria listed in Table R402.4.1.1 (Table N1102.4.1.1), as applicable to the method of construction.

7. **R402.4.1.2 (N1102.4.1.2) Testing (Mandatory)**. The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding 5 air changes per hour. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Testing shall be performed at any time after creation of all penetrations of the building thermal envelope. During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open;
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.

8. **R402.4.5 (N1102.4.5) Recessed lighting**. Recessed luminaries installed in the building thermal envelope shall be installed sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaries shall be IC-rated and labeled as having an air leakage rate not more than 2.0 cfm (0.944 L/s) when tested in accordance with ASTM E 283 at a 1.57 psf (75 Pa) pressure differential. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.

(c) **SECTION R403 SYSTEMS.**

1. **R403.1.1 (N1103.1.1) Programmable thermostat.**  
Section Deleted

2. **R403.9 (N1103.9) Snow melt system controls.**  
Section Deleted

**3. R403.10 (N1103.10) Residential pools and permanent residential spas.** Section Deleted

(i) **R403.10.1 (N1103.10.1) Residential pools and permanent residential spas.** Section Deleted

(ii) **R403.10.2 (N1103.10.2) Heaters.** Section Deleted

(iii) **R403.10.3 (N1103.10.3) Time Switches.** Section Deleted

(iv) **R403.10.4 (N1103.10.4) Covers.** Section Deleted

**4. R403.11 (N1103.11) Portable spas.** Section Deleted

**5. R403.12 (N1103.12) Residential pools and permanent residential spas.** Section Deleted

(d) **SECTION R404 ELECTRICAL POWER AND LIGHTING SYSTEMS.**

**1. R404.1 (N1104.1) Lighting equipment (Mandatory).**  
Not less than 75 percent of the lamps in permanently installed lighting fixtures at the time of inspection shall be high-efficacy lamps or not less than 75 percent of the permanently installed lighting fixtures shall contain only high efficacy lamps.

(e) **SECTION R405 SIMULATED PERFORMANCE ALTERNATIVE (PERFORMANCE) .**

**1. R405.1 (N1105.1) Scope.** This section establishes criteria for compliance using simulated energy performance analysis. Such analysis shall include heating cooling and service water heating energy only. The code official is not responsible for verification of compliance for documents submitted under this section.

**2. R405.3 (N1105.3) Performance-based compliance.**  
Compliance based on simulated energy performance requires

that a proposed residence (*proposed design*) be shown to have an annual energy cost that is less than or equal to the annual energy cost of the standard reference design. Energy prices shall be taken from a source such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report*. *Building officials*—shall be permitted to require time-or-use pricing in energy cost calculation.

3. **R405.6.2 Specific approval.** Performance analysis tools meeting the applicable provisions of Section R405 shall be permitted to be approved. Tools are permitted to be approved based on meeting a specified threshold. The Alabama Energy and Residential Codes Board shall be permitted to approve tools for a specified application or limited scope.

(f) **SECTION R406 ENERGY RATING INDEX COMPLIANCE ALTERNATIVE.**

1. **R406.1 (N1106.1) Scope.** This section establishes criteria for compliance using energy rating index analysis. Such analysis shall include heating cooling and service water heating energy only. The code official is not responsible for verification of compliance for documents submitted under this section.

2. **R406.4 (N1106.4) ERI-based compliance.** Compliance based on an ERI analysis requires that the rated design be shown to have an ERI less than or equal to a score of 70 in both zones 2 and 3 when compared to the ERI reference design.

(2) **EFFECTIVE DATE.** For purposes of enforcement, this code shall become effective on October 1, 2016.



## APPENDIX A

**TABLE R402.1.1 (N1102.1.1.1)  
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT <sup>a</sup>**

<u>CLIMATE ZONE</u>	FENESTRATION U-FACTOR <sup>b</sup>	SKY-LIGHT U-FACTOR <sup>b</sup>	GLAZED FENESTRATION SHGC <sup>b, e</sup>	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE <sup>i</sup>	FLOOR R-VALUE	BASEMENT <sup>c</sup> WALL R-VALUE	SLAB <sup>d</sup> R-VALUE & DEPTH	CRAWL SPACE <sup>e</sup> WALL R-VALUE
1	1.2	0.75	0.30	30	13	3/4	13	0	0	0
2	0.65 <sup>j</sup>	0.75	0.30	30	13	4/6	13	0	0	0
3	0.50 <sup>j</sup>	0.65	0.30	30	13	5/8	19	5/13 <sup>f</sup>	0	5/13
4 except Marine	0.35	0.60	NR	38	13	5/10	19	10/13	10, 2ft	10/13
5 and Marine 4	0.35	0.60	NR	38	20 or 13+5 <sup>h</sup>	13/17	30 <sup>g</sup>	10/13	10, 2ft	10/13
6	0.35	0.60	NR	49	20 or 13+5 <sup>h</sup>	15/19	30 <sup>g</sup>	15/19	10, 4ft	10/13
7 and 8	0.35	0.60	NR	49	21	19/21	38 <sup>g</sup>	15/19	10, 4ft	10/13

For SI: 1 foot = 304.8 mm.

- a. R-values are minimums. U-factors and SHGC are maximums. R-19 batts compressed into a nominal 2 x 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.
- b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.
- c. "15/19" means R-15 continuous insulated sheathing on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulated sheathing on the interior or exterior of the home. "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. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Zones 1 through 3 for heated slabs.
- e. There are no SHGC requirements in the Marine Zone.
- f. Basement wall insulation is not required in warm-humid locations as defined by Figure 301.1 and Table 301.1.
- 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, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of the 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. For impact rated fenestration complying with Section R301.2.1.2 of the *International Residential Code* or Section 1608.1.2 of the *International Building Code*, the maximum U-factor shall be 0.75 in Zone 2 and 0.65 in Zone 3.

**TABLE 402.1.4  
EQUIVALENT U-FACTORS<sup>a</sup>**

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor <sup>b</sup>	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
2	0.65	0.75	0.035	0.084	0.165	0.064	0.360	0.477
3	0.50	0.65	0.035	0.084	0.141	0.047	0.360	0.135

a. Non-fenestration 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 0.14 in Zone 2 and 0.12 in Zone 3.

**TABLE 402.3.3  
MINIMUM PROJECTION FACTOR REQUIRED BY ORIENTATION FOR SHGC  
EXCEPTION**

Orientation	Projection Factor
North	$\geq 0.40^a$
South	$\geq 0.20$
East	$\geq 0.50$
West	$\geq 0.50$

a. For the north orientation, a vertical projection located on the west edge of the fenestration with equivalent PF  $\geq 0.15$  shall also satisfy the minimum projection factor requirement.

**TABLE R405.5.2(1)**  
**SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing <sup>a</sup>	<p>Total area<sup>b</sup> =15% of the conditioned floor area</p> <p>Orientation: equally distributed to four cardinal compass orientations (N, E, S, &amp; W)</p> <p>U-factor: from Table 402.1.3</p> <p>SHGC: From Table 402.1.1 except that for climates with no requirement (NR)SHGC = 0.40 shall be used.</p> <p>Interior shade fraction: 0.92-(0.21 x SHGC for the standard reference design)</p> <p>External shading: none</p>	<p>As proposed</p> <p>As proposed</p> <p>As proposed</p> <p>As proposed</p> <p>As proposed</p> <p>As proposed</p>
Heating systems <sup>h</sup>	<p>Fuel type: same as proposed design</p> <p>Efficiencies:            Electric: air-source heat pump with prevailing federal minimum standards</p> <p>Nonelectric furnaces: natural gas furnace with prevailing federal minimum standards</p> <p>Nonelectric boilers: natural gas boiler with prevailing federal minimum standards</p> <p>Capacity: sized in accordance with Section N1103.6</p>	<p>As proposed</p> <p>As proposed</p> <p>As proposed</p> <p>As proposed</p> <p>As proposed</p>
Cooling systems <sup>h, j</sup>	<p>Fuel Type: Electric</p> <p>Efficiency: In accordance with prevailing federal minimum standards</p> <p>Capacity: sized in accordance with Section N1103.6</p>	<p>As proposed</p> <p>As proposed</p> <p>As proposed</p>
Service Water Heating <sup>h, k, i</sup>	<p>Fuel type: same as proposed design</p> <p>Efficiency: In accordance with prevailing federal minimum standards</p> <p>Use: gal/day = 30 10 x Nbr</p> <p>Tank temperature: 120° F</p>	<p>As proposed</p> <p>As proposed</p> <p>Same as standard reference</p>

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**Statutory Authority:** Code of Ala. 1975 §§41-23-80 through 85, as amended

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