ALABAMA DEPARTMENT OF ECONOMIC AND COMMUNITY AFFAIRS
ALABAMA ENERGY AND RESIDENTIAL CODES BOARD
ADMINISTRATIVE CODE

CHAPTER 305-2-4
ORGANIZATION AND AUTHORITY

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305-2-4-.01 Creation And Purpose.

The Residential Energy Codes Board of Alabama was originally created under the Alabama Department of Economic and Community Affair's area of responsibility. Governor Fob James signed Act 95-537 creating the Board for the purpose of promoting and overseeing the implementation of the Model Energy Code by encouraging the conservation and efficient use of residential energy resources within this state's local jurisdictions; encouraging and promoting the acceptance, adoption and implementation of residential model energy codes; advising and assisting local governments in adopting and implementing those model energy codes and identifying and promoting energy management technologies. In 2010 Governor Bob Riley signed Act 2010-185 increasing the representation of Board members and renaming the Board the Alabama Energy and Residential Codes Board (Board), and expanding the Board's authority with respect to all matters pertaining to the acceptance, adoption and implementation of commercial and residential energy codes and residential building codes by municipal and county governments in the state. These acts as amended are codified in Title 41, Chapter 23, Article 5 of the Code of Ala. 1975.

Author: Karen Clifton

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

History: **New Rule:** Filed April 5, 2012; effective May 10, 2012.

305-2-4-.02 Organization And Administration.

The Alabama Energy and Residential Codes Board is a seventeen member board established to carry out the provisions of the Code of Ala. 1975, §§41-23-80 through 85, as amended. The Alabama Energy and Residential Codes Board is administered by the Energy Division of the Alabama Department of Economic and Community Affairs.
Author: Karen Clifton, Heather Goggin
Statutory Authority: Code of Ala. 1975, §§41-23-82, as amended.
History: New Rule: Filed April 5, 2012; effective May 10, 2012.
Amended: Filed April 20, 2017; effective June 4, 2017.

305-2-4-.03 Officers.

(1) The Board shall elect from its members a Chairman and a Vice Chairman.

(2) The term of office for an officer of the Board shall be two years.

(3) An officer of the Board may serve two consecutive full terms in each elected office.

(4) The duties of the officers shall be as follows:

(a) The chairman shall preside at meetings of the Board and shall appoint members to serve on committees not defined by statute.

(b) The vice chairman shall preside in the absence of the chairman and shall assume the duties of the chairman when necessary.

Author: Heather Goggin
Statutory Authority: Code of Ala. 1975, §§41-23-82, as amended.
History: New Rule: Filed April 5, 2012; effective May 10, 2012.
Repealed and New Rule: Filed April 20, 2017; effective June 4, 2017.

305-2-4-.04 Subcommittees.

The Board shall include at least three subcommittees.

(1) Building Subcommittee: This committee shall review all proposals related to the International Residential Code, except for those relating to Chapter 11, Energy Efficiency.

Each subcommittee shall have a chairman to be appointed by the Board Chairman. The makeup of this subcommittee shall include the Board members representing the following organizations:

1. Alabama Board of General Contractors

2. Alabama Joint Fire Council

3. County governments

4. Home Builders Association of Alabama

5. Home Builders Licensure Board

6. House of Representatives member of the Permanent Joint Legislative Committee on Energy Policy

7. International Code Council (ICC) Alabama Chapter, Code Officials Association of Alabama

8. Municipalities

9. Property and Casualty Insurance Industry

10. Senate member of the Permanent Joint Legislative Committee on Energy Policy

11. Up to five at-large members

(2) Energy Subcommittee: This committee shall review all proposals related to the International Energy Efficiency Code. The makeup of this subcommittee shall include the Board members representing the following organizations:

1. Alabama Board of Heating, Air Conditioning, and Refrigeration

2. Alabama Council, American Institute of Architects

3. Alabama Liquefied Petroleum Gas Board

4. House of Representatives member of the Permanent Joint Legislative Committee on Energy Policy

5. International Code Council (ICC) Alabama Chapter, Code Officials Association of Alabama

6. Licensed professional engineers

7. Natural gas industry

8. Private, investor-owned, electric utility industry

9. Rural electric cooperative industry

10. Senate member of the Permanent Joint Legislative Committee on Energy Policy

11. Up to five at-large members

(3) At-large members shall be appointed by a committee to include the Board Chairman, the Board Vice Chairman, an ADECA Energy Division representative, the Building Subcommittee Chairman, and the Energy Subcommittee Chairman.

(4) Persons interested in filling an at-large position may complete the At-Large Nomination Form (Appendix A) when open positions are announced.

(5) At-large appointments shall be for the duration of one year, with the exception of the initial appointments, which shall have staggered end dates to ensure consistency.

(6) With the exception of the House of Representatives, the Alabama Senate, and the International Code Council, Alabama Chapter, no organization or industry may have more than one representative per subcommittee. No organization with a representative on a subcommittee may fill an at-large position.

Author: Heather Goggin
Statutory Authority: Code of Ala. 1975, §§41-23-85, as amended.
History: New Rule: Filed April 5, 2012; effective May 10, 2012.
Repealed and New Rule: Filed April 20, 2017; effective June 4, 2017.

305-2-4-.05 Promulgation Of Rules And Regulations.

The Board shall have the power to make rules and regulations for the conduct of its board meetings, procedures, and execution of the purpose, functions, powers, and duties delegated to it by the Code of Ala. 1975, Section 41-23-85. Rulemaking proceedings shall be in accordance with Code of Ala. 1975, Section 41-22-5.
Author: Karen Clifton
Statutory Authority: Code of Ala. 1975, §§41-23-85, as amended.
History: New Rule: Filed April 5, 2012; effective May 10, 2012.

305-2-4-.06 Petition For Adoption Or Amendment Of Code(s).

Any person who wishes to petition the Alabama Energy and Residential Codes Board to adopt, amend, or repeal any code shall submit said petition to the Energy Division of the Alabama

Department of Economic and Community Affairs, P.O. Box 5690, Montgomery, Alabama 36103-5690 in the following form:

PETITION FOR ADOPTION OR AMENDMENT OF CODE(S)

1. Petitioner

Name: _____

Jurisdiction: (If applicable)_____

Address: _____ Phone: _____

2. Character of Change

I propose that the Alabama Energy and Residential Codes Board:

A. ( ) Adopt the following new code.

B. ( ) Amend Code _____ as follows.

C. ( ) Repeal Code _____ in total.

3. Text of Proposed Code

- If you checked box "A" above, provide a typed copy of the code you propose.
- If you checked box "B" above, provide a typed copy of the existing code, adding any proposed language. Proposed new language should be underlined and proposed deletions should be stricken through.
- If you checked box "C" above, skip this and go to Part 4.

4. Purpose of Change

Briefly describe what the effect of this change will be, and why you believe the change should be made. Show the financial impact this change will have upon the public, how the impact figures were determined and the advantages and/or disadvantages of the proposed change and what effects the proposed change would have on existing energy, life, health or safety codes.

5. Signature

_____ _____
Petitioner Date

The Board shall consider the petition, and shall within ninety (90) days after review of the petition, either deny the petition in writing on the merits, stating its reasons for the denial, or

initiate rule-making proceedings in accordance with, Code of Ala. 1975, Section 41-22-5.
Author: Karen Clifton
Statutory Authority: Code of Ala. 1975, §§41-23-82, as amended.
History: **New Rule:** Filed April 5, 2012; effective May 10, 2012.

305-2-4-.07 Definitions.

(1) Alabama Energy and Residential Codes: The codes adopted by the Alabama Energy and Residential Codes Board and amended by the board.

(2) Commercial: For this code, all buildings not included in the definition of "Residential" and not under the authority of the Alabama Building Commission.

(3) Residential: The energy provisions of this code include detached one- and two-family dwellings and multiple single-family dwellings (townhouses) as well as Group R-2, R-3, and R-4 buildings three stories or less in height above grade plane.

(4) Farm Structure: Non-residential structures constructed on a farm for use by the farm.
Author: Karen Clifton, Bret Warren
Statutory Authority: Code of Ala. 1975, §§41-23-80 through 85, as amended.
History: **New Rule:** Filed April 5, 2012; effective May 10, 2012.
Amended: Filed February 12, 2014; effective March 19, 2014.

305-2-4-.08 Commercial Energy Code.

(1) Either the 2015 International Energy Conservation Code or the ANSI/ASHRAE/IES Standard 90.1-2013 shall be implemented and enforced for commercial buildings.

(2) For purposes of enforcement, this code shall become effective January 1, 2016.
Author: Karen Clifton
Statutory Authority: Code of Ala. 1975, §§41-23-80 thru 41-23-85, as amended.
History: **New Rule:** Filed April 5, 2012; effective May 10, 2012.
Amended: Filed February 12, 2014; effective March 19, 2014.
Repealed and New Rule: Filed September 21, 2015; effective October 26, 2015. **Amended:** Filed August 22, 2016; effective October 6, 2016.

305-2-4-.09 Residential Building Codes.

The 2015 International Residential Code (IRC) as modified below.

(1) **IRC CHAPTER 3 BUILDING PLANNING.**

(a) **SECTION R302 FIRE-RESISTANT CONSTRUCTION.**

1. **R302.5.1 OPENING PROTECTION.** Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than 1 3/8 inches (35mm) in thickness, solid or honeycomb core steel doors not less than 1 3/8 inches (35mm) thick, or 20 minute firerated doors.

(b) **SECTION R313 AUTOMATIC FIRE SPRINKLER SYSTEMS.**

1. **R313.1 Townhouse automatic fire sprinkler systems.** Where installed, automatic residential fire sprinkler systems shall be installed in accordance with Section P2904 or NFPA 13D.

2. **R313.2 ONE AND TWO FAMILY DWELLINGS AUTOMATIC FIRE SYSTEMS.** Where voluntarily installed, installations shall comply with this section.

(c) **SECTION R322 FLOOD-RESISTANT CONSTRUCTION.**

1. **R322.3.5.1 PROTECTION OF BUILDING ENVELOPE.** Section deleted.

(d) **SECTION 324 SOLAR PHOTOVOLTAIC ROOF SYSTEMS.**

1. **R324.7.2.2 HIP ROOF LAYOUTS.** Panels and modules installed on dwellings with hip roof layouts shall be located in a manner that provides a clear access pathway not less than 3 feet (914 mm) in width from the eave to the ridge on each roof slope where panels and modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof designed in accordance with Chapter 3.

(2) **IRC CHAPTER 11 ENERGY EFFICIENCY.**

(a) This chapter shall be deleted and replaced with Chapter 4 of the Residential Provisions of the 2015 International Energy Conservation Code, with the amendments adopted by the Alabama Energy and Residential Codes Board in §305-2-4-.10(4) of the Alabama Administrative Code.

(3) **IRC CHAPTER 24 FUEL GAS.**

(a) **SECTION G24122 (401) GENERAL.**

1. **G2412.9 (401.9) Identification.** Each length of pipe and tubing utilized in a fuel gas system shall bear the identification of the manufacturer. If not provided on the packaging or crating or by other approved documentation, each pipe fitting, utilized in a piping system shall bear the identification of the manufacturer.

(4) **IRC CHAPTER 34 ELECTRICAL GENERAL REQUIREMENTS.**

(a) **SECTION E3401 GENERAL.**

1. **R3401.1 Applicability.** The provisions of Chapters 34 through 43 shall establish the general scope of the electrical system and equipment requirements of this code. Chapters 34 through 43 cover those wiring methods and materials most commonly encountered in the construction of one- and two-family dwellings and structures regulated by this code. Other wiring methods, materials, and subject matter covered in NFPA 70-2008 or in compliance with the 2008 National Electric Code, or subsequent editions of such codes shall be allowed by this code and deemed equivalent with the code adopted by this board.

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

Author: Karen Clifton, Bret Warren, Heather Goggin
Statutory Authority: Code of Ala. 1975, §§41-23-80 thru 40-23-85, as amended.
History: New Rule: Filed April 5, 2012; effective May 10, 2012. **Amended:** Filed February 12, 2014; effective March 19, 2014. **Repealed and New Rule:** Filed August 22, 2016; effective October 6, 2016. **Amended:** Filed April 20, 2017; effective June 4, 2017.

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 (N1101.4) 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. **R103.3 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.

2. **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.

(d) **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 within the building thermal envelope.

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

(a) **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 R402 BUILDING THERMAL ENVELOPE**

1. R402.1.6 Insulation and fenestration requirements by component. (Mandatory). All R-values and associated Ufactors including SHGC for fenestration, skylights, glazed fenestration, ceiling, and wood frame walls in tables R402.1.2 (N1102.1.2) and R402.1.4 (N1102.1.4) shall be mandatory.

2. 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, an air impermeable insulation installed to the roof deck 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).

3. 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 weather-stripped and insulated to a level in accordance with the following insulation values:

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

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

(iii) 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.

4. **R402.2.10 (N1102.2.10) Slab on grade floors.** Section Deleted

5. **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.

6. **R402.3.2.1 (N1102.3.2.1) Glazed fenestration SHGC exception.** Where applicable, glazed fenestration

SHGC exception shall be as referenced in section C402.4.3.

7. **R402.4.1.1 (N1102.4.1.1) 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.

8. **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:

(i) Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weather-stripping or other infiltration control measures;

(ii) Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;

(iii) Interior doors, if installed at the time of the test, shall be open;

(iv) Exterior doors for continuous ventilation systems and heat

recovery ventilators shall be closed and sealed;

(v) Heating and cooling systems, if installed at the time of the test, shall be turned off; and

(vi) Supply and return registers, if installed at the time of the test, shall be fully open.

(b) **SECTION R403 SYSTEMS.**

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

2. R403.3.4 Duct leakage (Prescriptive). The total leakage of the ducts, where measured in accordance with Section R403.3.3, shall be as follows:

(i) Rough-in test: The total leakage shall be less than or equal to 4 cubic feet per minute (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area where the air handler is installed at the time of the test. Where the air handler is not installed at the time of the test, the total leakage shall be less than or equal to 3 cubic feet per minute (85 L/min) per 100 square feet (9.29 m^2) of conditioned floor area.

(ii) Post-construction test: Total leakage *to the outside* shall be less than or equal to 4 cubic feet per minute (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area.

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

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

(i) **R403.10.1 (N1103.10.1) Heaters.** Section Deleted

(ii) **R403.10.2 (N1103.10.2) Time Switches.** Section Deleted

(iii) **R403.10.3 (N1103.10.3) Covers.** Section Deleted

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

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

(c) **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.

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

1. **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 (N1105.6.2) 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

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

1. **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.

Author: Bret Warren, Heather Goggin
Statutory Authority: Code of Ala. 1975, §§41-23-80 thru 41-23-85, as amended.
History: New Rule: Filed September 21, 2015; effective October 26, 2015. **Amended:** Filed October 17, 2016; effective December 1, 2016. **Amended:** Filed August 21, 2017; effective October 5, 2017.

305-2-4-A Appendix A.

APPENDIX A

TABLE R402.1.2 (N1102.1.2)

INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT [a]

CLIMATE ZONE	FENESTRATION U-FACTOR[b]	SKYLIGHT U-FACTOR[b]	GLAZED FENESTRATION SHGC[b]	CEILING R-VALUE [f]	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[e]	FLOOR R-VALUE	BASEMENTWALL R-VALUE [c]	SLAB R-VALUE & DEPTH	CRAWL SPACE WALL R-VALUE [c]
2	0.35[f]	0.55	0.27	30	13	4/6	13	0	0	0
3	0.35[f]	0.55	0.27	30	13	5/8	19	5/13[d]	0	5/13

For SI: 1 foot = 304.8 mm.

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 SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in climate zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.

c. "5/13" means R-5 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.

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

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

f. Reference R402.2.2.1

TABLE 40202.1.4

EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor

			Factor c					
2	0.35	0.55	0.035	0.084	0.165	0.064	0.360	0.477
3	0.35	0.55	0.035	0.084	0.141	0.047	0.360	0.136

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.

c. Reference R402.2.2.1

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

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Above-grade walls	Type: mass wall if proposed wall is mass; otherwise wood frame.	As proposed
	Gross area: same as proposed	As proposed
	U-factor: as specified in Table R402.1.4	As proposed
	Solar absorptance = 0.75	As proposed
	Emittance = 0.90	As proposed
Basement and crawl space walls	Type: same as proposed	As proposed
	Gross area: same as proposed	As proposed
	U-factor: from Table R402.1.4 (as amended), with insulation layer on interior side of walls	As proposed
Above-grade floors	Type: wood frame	As proposed
	Gross area: same as proposed	As proposed
	U-factor: as specified in Table R402.1.4	As proposed
Ceilings	Type: wood frame	As proposed
	Gross area: same as proposed	As proposed
	U-factor: as specified in Table R402.1.4	As proposed

Roofs	Type: composition shingle on wood sheathing	As proposed
	Gross area: same as proposed	As proposed
	Solar absorptance = 0.75	As proposed
	Emittance = 0.90	As proposed
Attics	Type: vented with aperture = 1 ft^2 per 300 ft^2 ceiling area	As proposed
Foundations	Type: same as proposed	As proposed
	Foundation wall area above and below grade and soil characteristics: same as proposed	As proposed
Opaque doors	Area: 40 ft^2	As proposed
	Orientation: North	As proposed
	U-factor: same as fenestration from Table R402.1.4	As proposed
Vertical fenestration other than opaque doors	Total area[g] = (a) The proposed glazing area, where the proposed glazing area is less than 15 percent of the conditioned floor area (b) 15 percent of the conditioned floor area, where the proposed glazing area is 15 percent or more of the conditioned floor area	As proposed
	Orientation: equally distributed to four cardinal compass orientations (N, E, S & W).	As proposed
	U-factor: as specified in Table R402.1.4	As proposed
	SHGC: as specified in Table R402.1.2 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed
	Interior shade fraction: 0.92-(0.21 × SHGC for the standard reference design)	0.92-(0.21 × SHGC as proposed)
	External shading: none	As proposed
Skylights	None	As proposed

Thermally isolated sunrooms	None	As proposed

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

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Air exchange rate	Air leakage rate of 5 air changes per hour in climate zones 2 and 3 at a pressure of 0.2 inches w.g (50 Pa). The mechanical ventilation rate shall be in addition to the air leakage rate and the same as in the proposed design, but no greater than $0.01 \times CFA + 7.5 \times (N_{br} + 1)$ where: CFA = conditioned floor area N_{br} = number of bedrooms Energy recovery shall not be assumed for mechanical ventilation.	For residences that are not tested, the same air leakage rate as the standard reference design. For tested residences, the measured air exchange rate[a]. The mechanical ventilation rate[b] shall be in addition to the air leakage rate and shall be as proposed.
Mechanical ventilation	None, except where mechanical ventilation is specified by the proposed design, in which case: Annual vent fan energy use: $kWh/yr = 0.03942 \times CFA + 29.565 \times (N_{br}+1)$ where: CFA = conditioned floor area N_{br} = number of bedrooms	As proposed
Internal gains	$IGain = 17,900 + 23.8 \times CFA + 4104 \times N_{br}$ (Btu/day per dwelling unit)	Same as standard reference design.
Internal mass	An internal mass for furniture and contents of 8 pounds per square foot of floor area.	Same as standard reference design, plus any additional mass specifically designed as a thermal storage element but not integral to the building envelope or structure.
Structural mass	For masonry floor slabs, 80 percent of floor area covered by R-2 carpet and pac and 20 percent of floor directly exposed to room air.	As proposed
Internal gains	IGain = 17,900 + 23.8 × CFA + 4104 × Nbr (Btu/day per dwelling unit)	Same as standard reference design.
Internal mass	An internal mass for furniture and contents of 8 pounds per square foot of floor area.	Same as standard reference design, plus any additional mass specifically designed as a thermal storage element but not integral to the building envelope or structure.

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

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Structural mass	For masonry floor slabs, 80 percent of floor area covered by R-2 carpet and pac and 20 percent of floor directly exposed to room air.	As proposed
	For masonry basement walls, as proposed but with insulation required by Table R402.1.4 located on the interior side of the walls	As proposed
	For other walls, for ceilings, floors, and interior walls, wood frame construction	As proposed
Heating systems[c,d]	Fuel type: same as proposed design	As proposed
	Efficiencies: Electric: air-source heat pump with prevailing federal minimum standards	As proposed
	Nonelectric furnaces: natural gas furnace with prevailing federal minimum standards	As proposed
	Nonelectric boilers: natural gas boiler with prevailing federal minimum standards	As proposed
	Capacity: sized in accordance with Section N1103.6	As proposed
Cooling systemsc, e	Fuel Type: Electric	As proposed
	Efficiency: In accordance with prevailing federal minimum standards	As proposed
	Capacity: sized in accordance with Section N1103.6	As proposed
Service water heatingc, d, e, f	Fuel type: same as proposed design	As proposed
	Efficiency: In accordance with prevailing federal minimum standards	As proposed
	Use: gal/day = 30 10 x Nbr	
	Tank temperature: 120° F	Same as standard reference
Thermal distribution systems	Duct insulation: From Section R403.2.1 A thermal distribution system efficiency (DSE) of 0.88 shall be applied to both the heating and cooling system efficiencies for all systems other than tested duct systems. For tested duct systems, the leakage rate shall be 4 cfm (113.3 L/min) per 100 ft2 (9.29 m2) of conditioned floor area at a pressure of differential of 0.1 inches w.g. (25 Pa).	As tested or as specified in Table R405.5.2(2) if not tested. Duct insulation shall be as proposed.

(continued)

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

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Thermostat	Type: Manual, cooling temperature setpoint = 75°F; Heating temperature setpoint = 72°F	Same as standard reference

For SI: 1 square foot = 0.93 m^2, 1 British thermal unit = 1055 J, 1 pound per square foot = 4.88 kg/m^2, 1 gallon (US) = 3.785 L, °C = (°F-32)/1.8, 1 degree = 0.79 rad.

a. Where required by the *code official*, testing shall be conducted by an *approved* party. Hourly calculations as specified in the ASHRAE *Handbook of Fundamentals*, or the equivalent shall be used to determine the energy loads resulting from infiltration.
b. The combined air exchange rate for infiltration and mechanical ventilation shall be determined in accordance with Equation 43 of 2001 ASHRAE *Handbook of Fundamentals*, page 26.24 and the "Whole-house Ventilation" provisions of 2001 ASHRAE *Handbook of Fundamentals*, page 26.19 for intermittent mechanical ventilation.
c. For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.
d. For a proposed design without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design.
e. For a proposed design home without a proposed cooling system, an electric air conditioner with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.
f. For a proposed design with a nonstorage-type water heater, a 40-gallon storage-type water heater with the prevailing federal minimum energy factor for the same fuel as the predominant heating fuel type shall be assumed. For the case of a proposed design without a proposed water heater, a 40-gallon storage-type water heater with the prevailing federal minimum efficiency for the same fuel as the predominant heating fuel type shall be assumed for both the proposed design and standard reference design.
g. For residences with conditioned basements, R-2 and R-4 residences and townhouses, the following formula shall be used to determine glazing area:

$AF = A_s \times FA \times F$

where:
AF = Total glazing area
A_s = Standard reference design total glazing area.
FA = (Above-grade thermal boundary gross wall area)/(above-grade boundary wall area + 0.5 x below-grade boundary wall area).
F = (Above-grade thermal boundary wall area)/(above-grade thermal boundary wall area + common wall area) or 0.56, whichever is greater.
and where:
Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.
Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.
Below-grade boundary wall is any thermal boundary wall in soil contact.
Common wall area is the area of walls shared with an adjoining dwelling unit.
L and CFA are in the same units.

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

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