EXHIBIT E2

~~Arkansas Energy Code for New Building Construction Supplements and Amendments~~

~~2011~~

~~Arkansas Energy Office~~
~~Arkansas Economic Development Commission~~

~~ARKANSAS ENERGY CODE FOR NEW BUILDING CONSTRUCTION SUPPLEMENTS AND AMENDMENTS~~

~~CONTENTS~~

Introduction

The Arkansas General Assembly authorized the Arkansas Energy Office to promulgate these regulations in Section 3(B)(2)(c) of Act 7 of 1981. These rules and regulations are in adherence with the Administrative Procedures Act.

For residential structures, Arkansas adopts the International Energy Conservation Code (IECC), 2003 Edition, published and copyrighted by the International Codes Council. The residential portion of the *Arkansas Energy Code for New Building Construction* is composed of the 2003 Edition of the International Energy Conservation Code (2003 IECC) combined with these *Supplements and Amendments*.

Chapters 2 through 6 of the 2003 IECC provide regulations for residential construction. To order copies of the *International Energy Conservation Code*, *2003 Edition* contact:

International Code Council
900 Montclair Road
Birmingham, Alabama 35213-1206
Phone: 1-800-786-4452, Fax: 205-591-0775

For commercial structures, the Arkansas Energy Code for New Building Construction adopts by reference the *American Society of Heating, Refrigerating, and Air-Conditioning Engineers* (ASHRAE) *ANSI / ASHRAE /IESNA Standard 90.1-2001 Energy Standard for Buildings Except Low-Rise Residential Buildings* which will be in effect until 12/31/2012. On and after 1/1/2013 Arkansas will adopt by reference *ANSI / ASHRAE /IESNA Standard 90.1-2007* , and as an alternative, Chapter 5 of the *2009 International Energy Conservation Code* with its associated definitions, general requirements and referenced standards. Both codes are available from the International Code Council at the above address.

To order copies of *American Society of Heating, Refrigerating, and Air-Conditioning Engineers ANSI/ASHRAE/IESNA Standard 90.1-2001* or *2007* contact:

American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc.
1791 Tullie Circle, N.E.
Atlanta, GA 30329
Phone: 404-636-8400, Fax: 404-321-5478
Web: www.ashrae.org

Questions, inquiries or request for copies of the *Arkansas Energy Code for New Building Construction Supplements and Amendments* may be addressed to:

Arkansas Energy Office
Attn: *Arkansas Energy Code for New Building Construction*
900 West Capitol
Little Rock, AR 72201
Phone: 800-558-2633 or 501-682-6103, Fax: 501-682-7499
Email: EnergyInfo@ArkansasEDC.com
Download code information and compliance tools at: www.ArkansasEnergy.org. Click on the Residential tab on top, then Builders and Energy Code on the left side.

OVERVIEW

This document supplements and amends the *International Energy Conservation Code (IECC), 2003 Edition*. In cases where there are differences between these "Supplements and Amendments" and the IECC 2003 Edition, or with *ANSI/ASHRAE/IESNA Standard 90.1-2001 or Standard 90.1-2007* or Chapter 5 of the 2009 IECC, these "Supplements and Amendments" shall take precedence.

Each of the following Chapters of this document associates directly with the corresponding chapters of the 2003 IECC unless otherwise noted.

RESIDENTIAL

- **Chapter 1.** Administration – Deleted. Replaced with the *Arkansas Energy Code for New Building Construction Supplements and Amendments, Chapter 1, Administration and Enforcement*.
- **Chapter 2**: **Definitions**.
- **Chapter 3**: **Design Conditions**. Establishes the design criteria for the entire state of Arkansas and defines Arkansas' four climate zones. The climate zones establish the design conditions for use with Chapters 4, 5, 6 and 8.

  This chapter has been modified to include a map of Arkansas with a list of counties and their associated climate zones, and a table identifying the Heating Degree Day (HDD) ranges associated with each zone.
- **Chapter 4**: Pertains to **residential building design by systems analysis**, as well as the use of renewable resources such as wind, solar, geothermal, etc.

  Section 402.2.3.1.3 has been deleted which required windows to have a 0.40 Solar Heat Gain Coefficient (SHGC) in homes located in areas experiencing less than 3,500 HDD.
- **Chapter 5**: **Residential compliance by designed component[1] performance** – this analyzes the total building for compliance one component at a time. Assuming each individual component of the building meets the thermal requirements of the code then the entire building is deemed to comply. This chapter offers the use of "trade-offs" to achieve compliance by allowing the builder to substitute or "trade-off" values between building components. A properly executed use of an Arkansas Energy Office approved compliance tool may be used to validate any trade-off.

  Section 502.1.5 has been deleted which required the 0.40 SHGC. The *R* values in the Minimum Duct Insulation **Table 503.3.3.3** have been changed. Also **footnote "b"** under that same table has been deleted which stated that insulation on return ducts located in a basement is not required. All references to the *International Mechanical Code* have been changed to the *Arkansas Mechanical Code*.
- **Chapter 6**: Offers **residential prescriptive compliance** via the single step compliance method by selecting an option directly from the charts in the applicable climate zone. The values from the option show the minimum requirements for each component of a residential structure for the specific climate zone. An approved Arkansas Energy Office prescripive compliance tool may be used to validate code compliance.

  Section 602.2 has been deleted which required the 0.40 SHGC.

COMMERCIAL

- **Chapter 7**: Pertains to **building design for commercial buildings**, except those that comply with Chapter 8. *ANSI/ASHRAE/IESNA Standard 90.1-2001* is adopted by reference and will be in effect until 12/31/2012. On and after 1/1/2013 *ANSI/ASHRAE/IESNA Standard 90.1-2007* will be in effect. An approved Arkansas Energy Office compliance tool may be used to validate compliance.

- **Chapter 8**: Chapter 8 of the 2003 IECC is in effect until 12/31/2012. On and after 1/1/2013 Chapter 8 is removed in its entirity and replaced with Chapter 5 of the 2009 International Energy Conservation Code (2009 IECC) with its associated definitions, general requirements and referenced standards. All references to the *International Mechanical Code* have been changed to the *Arkansas Mechanical Code*. An approved Arkansas Energy Office compliance tool may be used to validate compliance.

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[1] The word "component" for the purposes of this code is defined as being a particular segment of a building such as a wall, ceiling, or floor. Hence, the terms *wall component* or *ceiling component*.

SUMMARY

Chapters 4, 5 and 6 of the 2003 IECC offer different methods to achieve code compliance for low-rise residential construction. For commercial and high-rise residential construction Chapters 7 and 8 offer different methods to achieve code compliance for commercial and high-rise residential construction and refer to ASHRAE 90.1-2001 which is in effect until 12/31/2012. On and after 1/1/2013 ASHRAE 90.1-2007 becomes effective for commercial and high-rise residential construction and Chapter 8 of the 2003 IECC is removed and replaced with Chapter 5 of the 2009 IECC.

These amendments have five significant changes:

1) Chapter 1 – Administration was deleted and replaced with the *Arkansas Energy Code for New Building Construction Supplements and Amendments, Chapter 1, Administration and Enforcement*.
2) The requirement of a 0.4 Solar Heat Gain Coefficient in Chapters 4, 5 and 6 was deleted.
3) The residential duct insulation requirement was changed.
4) *ANSI/ASHRAE/IESNA 90.1-2001* is referenced for commercial buildings and high-rise residential buildings in Chapters 7 and 8 until 12/31/2012. On and after 1/1/2013 *ANSI/ASHRAE/IESNA 90.1-2007* is referenced for commercial buildings and high-rise residential buildings.
5) On and after 1/1/2013 Chapter 8 of the 2003 IECC is deleted and replaced with Chapter 5 of the 2009 IECC.

ARKANSAS AMENDMENTS

** Revise the Arkansas Energy Code for New Building Construction Supplements and Amendments (the 2003 Edition of the International Energy Conservation Code), as follows:*

CHAPTER 1
ADMINISTRATION

Delete entire CHAPTER 1 ADMINISTRATION. Replace with the *Arkansas Energy Code for New Building Construction Supplements and Amendments, CHAPTER 1, ADMINISTRATION AND ENFORCEMENT* as follows.

CHAPTER 1

ADMINISTRATION and ENFORCEMENT

SECTION 101
GENERAL

101.1 Title. These regulations shall be known as the *Arkansas Energy Code for New Building Construction Supplements and Amendments*, and shall be cited as such. Unless otherwise specified, this *Arkansas Energy Code for New Building Construction Supplements and Amendments*, the 2003 International Energy Conservation Code, ASHRAE 90.1-2001, ASHRAE 90.1-2007 and Chapter 5 of the 2009 IECC are referred to herein as "this Code" or "the Arkansas Energy Code."

101.2 Scope. This Code establishes minimum prescriptive and performance-related regulations for the design of energy-efficient buildings and structures or portions thereof that provide facilities or shelter for public assembly, educational, business, mercantile, institutional, storage and residential occupancies, as well as those portions of factory and industrial occupancies designed primarily for human occupancy. This Code thereby addresses the design of energy-efficient building envelopes and the selection and installation of energy-efficient mechanical, service water-heating, electrical distribution and illumination systems and equipment for the effective use of energy in these buildings and structures. NOTE: All referenced Chapters, Sections and Tables in this Chapter correspond directly to the *International Energy Conservation Code, 2003 Edition* unless otherwise noted.

101.2.1 Exempt buildings. Buildings and structures indicated in Sections 101.2.1.1 through 101.2.1.5 shall be exempt from the building envelope provisions of this Code, but shall comply with the provisions for building, mechanical, service water heating and lighting systems.

101.2.1.1 Separated buildings. Buildings and structures, or portions thereof separated by building envelope assemblies from the remainder of the building, that have a peak design rate of energy usage less than 3.4 Btu/h per square foot (10.7 W/m^2) or 1.0 watt per square foot (10.7 W/m^2) of floor area for space conditioning purposes.

101.2.1.2 Unconditioned buildings. Buildings and structures or portions thereof, which are neither heated nor cooled.

101.2.1.3: Buildings and structures or portions thereof that are exclusively heated or cooled by renewable fuels.

101.2.1.4: Mobile homes

101.2.1.5: Temporary use structures such as hunting and fishing camps, boat houses, remote cabins, etc. that do not meet the definition of "dwelling units" in Section 202; General Definitions.

101.2.2 Applicability. The provisions of this Code shall apply to all matters affecting or relating to structures and premises, as set forth in Section 101. Where, in a specific case, different sections of this Code specify different materials, methods of construction or other requirements, the most restrictive shall govern.

101.2.2.1 Existing installations. Except as otherwise provided for in this chapter, a provision in this Code shall not require the removal, alteration or abandonment of, nor prevent the continued utilization and maintenance of, an existing building envelope, mechanical, service water-heating, electrical distribution or illumination system lawfully in existence at the time of the adoption of this Code.

101.2.2.2 Additions to Existing Buildings: Additions to existing buildings or structures may be made to such buildings or structures without making the entire building or structure comply. The new addition shall conform to the provisions of this Code as they relate to new construction only.

101.2.2.3 Renovations: Any rehabilitation of an existing building that requires more than 25 percent of the gross floor area or volume of the entire building to be rebuilt shall comply with this Code. Cosmetic work such as painting, wall covering, wall paneling, and floor covering shall not be included.

101.2.2.4 Historic buildings. The provisions of this Code relating to the construction, alteration, repair, enlargement, restoration, relocation or movement of buildings or structures shall not be mandatory for existing buildings or structures specifically identified and classified as historically significant by the state or local jurisdiction, listed in *The National Register of Historic Places* or which have been determined to be eligible for such listing.

101.2.3 Mixed occupancy. When a building houses more than one occupancy, each portion of the building shall conform to the requirements for the occupancy housed therein. Where minor accessory uses do not occupy more than 10 percent of the area of any floor of a building, the major use shall be considered the building occupancy. Buildings, other than detached one- and two-family dwellings and townhouses, with a height of four or more stories above grade shall be considered commercial buildings for purposes of this Code, regardless of the number of floors that are classified as residential occupancy.

101.3 Intent. The provisions of this Code shall regulate the design of building envelopes for adequate thermal resistance and low air leakage and the design and selection of mechanical, electrical, service water heating and illumination systems and equipment which will enable effective use of energy in new building construction. It is intended that these provisions provide flexibility to permit the use of innovative approaches and techniques to achieve effective utilization of energy. This Code is not intended to abridge safety, health or environmental requirements under other applicable codes or ordinances.

101.4 Compliance. Compliance with this Code shall be determined in accordance with Sections 101.4.1 and 101.4.2.

101.4.1 Residential buildings. For residential buildings the following shall be used as the basis for compliance assessment: a systems approach for the entire building (Chapter 4), an approach based on performance of individual components of the building envelope (Chapter 5), an approach based on performance of the total building envelope (Chapter 5), an approach based on acceptable practice for each envelope component (Chapter 5), an approach by prescriptive specification for individual components of the building envelope (Chapter 5), or an approach based on simplified, prescriptive specification (Chapter 6) where the conditions set forth in Section 101.4.1.1 or 101.4.1.2 are satisfied.

101.4.1.1 Detached one- and two-family dwellings. When the glazing area does not exceed 15 percent of the gross area of exterior walls.

101.4.1.2 Residential buildings, Group R-2, R-4 or townhouses. When the glazing area does not exceed 25 percent of the gross area of exterior walls.

101.4.2 Commercial buildings. For commercial buildings, a prescriptive or performance-based approach (Chapter 7) or as specified by acceptable practice (Chapter 8) shall be used as the basis for compliance assessment up to 12/31/2012. On and after 1/1/2013 ANSI/ASHRAE/IESNA 90.1-2007 or Chapter 5 of the 2009 IECC shall be used as a basis for compliance assessment.

101.4.3 Builder Acknowledgement. Cities or counties that issue building permits for new building construction are required to record that the builder has certified that the proposed building will comply with the Arkansas Energy Code.

101.5 Adoption. Arkansas Code § 15-10-205(b)(3)(B) requires that any city or county in Arkansas which issues building permits for new building construction (referred to herein as "applicable cities or counties") shall adopt the Arkansas Energy Code as amended.

101.5.1 Date of Adoption. Applicable cities or counties shall adopt the Arkansas Energy Code prior to December 31, 2012.

101.5.2 Acknowledgement of Adoption. Upon adoption of the Arkansas Energy Code, applicable cities or counties are required to submit a copy of the adoption ordinance to the Arkansas Energy Office. If the applicable city or county has not adopted the Arkansas Energy Code by December 31, 2012, the mayor and/or county judge is required to submit a letter to the Arkansas Energy Office, no later than 60 days after this deadline, describing why the city or county is not in compliance with Arkansas Code § 15-10-205(b)(3)(B).

SECTION 102
MATERIALS, SYSTEMS AND EQUIPMENT

102.1 General. Materials, equipment and systems shall be identified in a manner that will allow a determination of their compliance with the applicable provisions of this Code.

102.2 Materials, equipment and systems installation. All insulation materials, caulking and weatherstripping, fenestration assemblies, mechanical equipment and systems components, and water heating equipment and system components shall be installed in accordance with the manufacturer's installation instructions.

102.3 Maintenance information. Required regular maintenance actions shall be clearly stated and incorporated on a readily accessible label. Such label shall include the title or publication number, the operation and maintenance

manual for that particular model and type of product. Maintenance instructions shall be furnished for equipment that requires preventive maintenance for efficient operation.

102.4 Insulation installation. Roof/ceiling, floor, wall cavity and duct distribution systems insulation shall be installed in a manner that permits inspection of the manufacturer's *R*-value identification mark.

102.4.1 Protection of exposed foundation insulation. Insulation applied to the exterior of foundation walls and around the perimeter of slab-on-grade floors shall have a rigid, opaque and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed area of the exterior insulation and extend a minimum of 6 inches (153 mm) below grade.

102.5 Identification. Materials, equipment and systems shall be identified in accordance with Sections 102.5.1, 102.5.2 and 102.5.3.

102.5.1 Building envelope insulation. A thermal resistance (R) identification mark shall be applied by the manufacturer to each piece of building envelope insulation 12 inches (305 mm) or greater in width. Alternatively, the insulation installer shall provide a signed and dated certification for the insulation installed in each element of the building envelope, listing the type of insulation installations in roof/ceilings, the manufacturer and the *R*-value. For blown-in or sprayed insulation, the installer shall also provide the initial installed thickness, the settled thickness, the coverage area and the number of bags installed. Where blown-in or sprayed insulation is installed in walls, floors and cathedral ceilings, the installer shall provide a certification of the installed density and *R*-value. The installer shall post the certification in a conspicuous place on the job site.

102.5.1.1 Roof/ceiling insulation. The thickness of roof/ceiling insulation that is either blown in or sprayed shall be identified by thickness markers that are labeled in inches or millimeters installed at least one for every 300 square feet (28 m^2) throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness and minimum settled thickness with numbers a minimum of 1 inch (25 mm) in height. Each marker shall face the attic access. The thickness of installed insulation shall meet or exceed the minimum initial installed thickness shown by the marker.

102.5.2 Fenestration product rating, certification and labeling. *U*-factors of fenestration products (windows, doors and skylights) shall be determined in accordance with NFRC 100 by an accredited, independent laboratory, and labeled and certified by the manufacturer. The solar heat gain coefficient (SHGC) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Where a shading coefficient for a fenestration product is used, it shall be determined by converting the product's SHGC, as determined in accordance with NFRC 200, to a shading coefficient, by dividing the SHGC by 0.87. Such certified and labeled *U*-factors and SHGCs shall be accepted for purposes of determining compliance with the building envelope requirements of this Code.

When a manufacturer has not determined product *U*-factor in accordance with NFRC 100 for a particular product line, compliance with the building envelope requirements of this Code shall be determined by assigning such products a default *U*-factor in accordance with Tables 102.5.2(1) and 102.5.2(2). When a SHGC or shading coefficient is used for code compliance and a manufacturer has not determined product SHGC in accordance with NFRC 200 for a particular product line, compliance with the building envelope requirements of this Code shall be determined by assigning such products a default SHGC in accordance with Table 102.5.2(3). Product features must be verifiable for the product to qualify for the default value associated with those features. Where the existence of a particular feature cannot be determined with reasonable certainty, the product shall not receive credit for that feature. Where a composite of materials from two different product types is used, the product shall be assigned the higher *U*-factor.

102.5.3 Duct distribution systems insulation. A thermal resistance (R) identification mark shall be applied by the manufacturer in maximum intervals of no greater than 10 feet (3048 mm) to insulated flexible duct products showing the thermal performance *R*-value for the duct insulation itself (excluding air films, vapor retarders or other duct components).

TABLE 102.5.2(1)
***U*-FACTOR DEFAULT TABLE FOR WINDOWS, GLAZED DOORS AND SKYLIGHTS**

FRAME MATERIAL AND PRODUCT TYPE[a]	SINGLE GLAZED	DOUBLE GLAZED
Metal without thermal break:		
Curtin wall	1.22	0.79
Fixed	1.13	0.69
Garden window	2.60	1.81
Operable (including sliding and swinging glass doors)	1.27	0.87
Site-assembled sloped/overhead glazing	1.36	0.82
Skylight	1.98	1.31
Metal with thermal break:		
Curtain wall	1.11	0.68
Fixed	1.07	0.63
Operable (including sliding and swinging glass doors)	1.08	0.65
Site-assembled sloped/overhead glazing	1.25	0.70
Skylight	1.89	1.11
Reinforced vinyl/metal clad wood:		
Fixed	0.98	0.56
Operable (including sliding and swinging glass doors)	0.90	0.57
Skylight	1.75	1.05
Wood/vinyl/fiberglass:		
Fixed	0.98	0.56
Garden window	2.31	1.61
Operable (including sliding and swinging glass doors)	0.89	0.55
Skylight	1.47	0.84

a. Glass block assemblies with mortar but without reinforcing or framing shall have a *U* factor of 0.60.

TABLE 102.5.2(2)
***U*-FACTOR DEFAULT TABLE FOR NONGLAZED DOORS**

DOOR TYPE	WITH FOAM CORE	WITHOUT FOAM CORE
Steel doors (1.75 inches thick)	0.35	0.60
	WITH STORM DOOR	**WITHOUT STORM DOOR**
Wood doors (1.75 inches thick)		
Hollow core flush	0.32	0.46
Panel with 0.438 inch panels	0.36	0.54
Panel with 1.125 inch panels	0.28	0.39
Solid core flush	0.26	0.40

For SI: 1 inch = 25.4 mm.

TABLE 102.5.2(3)
SHGC DEFAULT TABLE FOR FENESTRATION

PRODUCT DESCRIPTION	SINGLE GLAZED				DOUBLE GLAZED			
	Clear	Bronze	Green	Gray	Clear + Clear	Bronze + Clear	Green + Clear	Gray + Clear
Metal frames								
Fixed	0.78	0.67	0.65	0.64	0.68	0.57	0.55	0.54
Operable	0.75	0.64	0.62	0.61	0.66	0.55	0.53	0.52
Nonmetal frames								
Fixed	0.75	0.64	0.62	0.61	0.66	0.54	0.53	0.52
Operable	0.63	0.54	0.53	0.52	0.55	0.46	0.45	0.44

SECTION 103
ALTERNATE MATERIALS—METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEMS

103.1 General. The provisions of this Code are not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been approved by the code official as meeting the intent of the Code.

Compliance with specific provisions of this Code may be determined through the use of deemed to comply computer software, worksheets, compliance manuals and other similar materials when they have been approved by the Arkansas Energy Office.

SECTION 104
CONSTRUCTION DOCUMENTS

104.1 General. Construction documents and other supporting data shall be submitted in one or more sets with each application for a permit. The construction documents and designs submitted under the provisions of Chapter 4 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 additional construction documents to be prepared by a registered design professional.

Exceptions:

1. The code official is authorized to waive the submission of construction documents and other supporting data not required to be prepared by a registered design professional if it is found that the nature of the work applied for is such that reviewing of construction documents is not necessary to obtain compliance with this Code.

2. For residential buildings having a conditioned floor area of 5,000 square feet (465 m^2) or less, designs submitted under the provisions of Chapter 4 shall be prepared by anyone having qualifications acceptable to the code official.

104.2 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 code 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 and the equipment and systems as herein governed, including, but not limited to, design criteria, exterior envelope component materials, *U*-factors of the envelope systems, *U*-factors of fenestration products, *R*-values of insulating materials, size and type of apparatus and equipment, equipment and systems controls and other pertinent data to indicate compliance with the requirements of this Code and relevant laws, ordinances, rules and regulations, as determined by the code official.

104.3 Design Professional: Architects and engineers employed to prepare plans and specifications for new buildings shall ensure the plans and specifications comply with the provisions of this Code in a manner consistent with their obligations under Arkansas State law (see also the *Arkansas Fire Prevention Code 2007 Edition*, Volume I Fire, Volume II Building and Volume III Residential).

SECTION 105
CONTRACTOR / BUILDER COMPLIANCE

105.1 General: Compliance with this Code shall be the obligation of the licensed builder or contractor.

105.1.1 Compliance: Compliance signifies that the licensed builder or contractor has constructed or will construct or renovate the building in compliance with the requirements of this Code, and that by inspection within a two-year period from the date of completion, if the building fails to meet the Code's specifications, understands that he or she is responsible for bringing the building into compliance with this Code.

105.1.2 Compliance Materials: Compliance materials, instructions and Arkansas Energy Office approved tools and third-party services, are made a part of this Code by reference.

105.1.3 Compliance by Self-Builders: Compliance with this Code by builders who build, or contract to build, single-family buildings for their own occupancy is voluntary.

105.2 Compliance Alternatives

105.2.1 Alternative Compliance Tools: Arkansas Energy Office approved alternative compliance tools may be used to validate code compliance.

105.2.2 Federally Financed Homes: Newly constructed single and multi-family buildings financed through HUD/FHA, VA, and USDA Rural Development programs shall meet the thermal performance requirements of this Code.

SECTION 106
INSPECTIONS

106.1 General. Construction or work that must comply with this Code shall be subject to inspection by the Arkansas Energy Office or its agent, or by the code official.

106.2 Final inspection. Code officials within a county or municipality who have adopted this Code and conduct final inspections as a part of their normal operations shall perform a final inspection and approval for buildings when completed and ready for occupancy.

106.3 Reinspection. The Arkansas Energy Office or its agent or code official may cause a structure to be reinspected.

SECTION 107
ENFORCEMENT

107.1 General: Enforcement of this Code shall be the responsibility of the Arkansas Energy Office or local government (when adopted).

107.2 Local Government: All counties, cities or municipalities that issue building permits for new building construction are required to adopt this Code for new construction, additions and renovation of existing structures. However, the local municipality shall not in any way modify the energy conservation standards in this Code or promulgate or adopt rules or regulations that are less stringent than this Code.

A local government may exercise other administrative and enforcement procedures that it deems necessary to affect the purposes of this Code, including, but not limited to, prior plan approval, building permit requirements, and inspections during the course of construction.

SECTION 108
APPEALS

108.1 Board of Appeals: Any appeal of the energy conservation standards contained in this Code shall be made to the Board of Appeals established by the Arkansas Energy Office, and a decision on an appeal will be made within 45 days of its filing.

108.2 Local Government: In any county or municipality where this Code is adopted, the governing body shall establish a Board of Appeals to adjudicate complaints arising from the application of the Code. When a Board of Appeals is established, the governing body shall prescribe procedures for providing a fair and reasonable hearing of the appeal.

SECTION 109
VALIDITY

109.1 General. If a section, subsection, sentence, clause or phrase of this Code is, for any reason, held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this Code.

SECTION 110
RESPONSIBILITY

110.1 These minimum standards shall not be construed as relieving the licensed builder or contractor of his or her responsibility for compliance with local ordinances, codes, and regulations.

SECTION 111
REFERENCED STANDARDS

111.1 General. The standards, and portions thereof, which are referred to in this Code and listed in Chapter 10, shall be considered part of the requirements of this Code to the extent of such reference.

111.2 Conflicting requirements. When a section of this Code and a section of a referenced standard from Chapter 10 specify different materials, methods of construction or other requirements, the provisions of this Code shall apply.

SECTION 112
EFFECTIVE DATE

112.1 The effective date of this Code for residential buildings, as defined herein, is 10/1/2004. ASHRAE 90.1-2001 and Chapter 8 of the 2003 IECC are in effect for commercial buildings until 12/31/2012. The effective date for ASHRAE 90.1-2007 and Chapter 5 of the 2009 IECC for commercial buildings, as defined herein, is 1/1/2013.

CHAPTER 2
DEFINITIONS

* Revise Section 202 GENERAL DEFINITIONS to read as follows:

EFFICIENCY, HVAC SYSTEM. The ratio of useful energy output (at the point of use) to the energy input in consistent units for a designated time period, expressed in percent.

RECOOLING. The removal of heat by sensible cooling of the supply air (directly or indirectly) which has been previously heated above the temperature to which the air is to be supplied to the conditioned space for proper control of the temperature of that space.

RECOVERED ENERGY. Energy utilized which would otherwise be wasted (i.e., not contribute to a desired end use) from an energy utilization system.

RESET. Adjustment of the set point of a control instrument to a higher or lower value automatically or manually to conserve energy.

RESIDENTIAL BUILDING. Detached one- and two-family dwellings.

CHAPTER 3
DESIGN CONDITIONS

TABLE 302.1
EXTERIOR DESIGN CONDITIONS

* Revise footnotes *b* and *c* and add footnote *d* under table 302.1 as follows:

b. The degree days heating (base 60°F) and cooling (base 60°F) shall be selected from NOAA "Annual Degree Days to Selected Bases Derived from the 1961–1990 Normals," the ASHRAE *Handbook of Fundamentals*, data available from adjacent military installations, or other source of local weather data acceptable to the code official.

c. The climate zone shall be selected from the map provided in Figure 302.1(1) on the following page.

d. Load calculations may be determined by using ACCA Manual J for residential, and ACCA Manual N for commercial.

* Add the following FIGURES: 302.1(1) showing the four climate zones in Arkansas with a list of counties and their associated climate zones, and Table 302.2 Arkansas HDD and zones; and add FIGURE 501.3 showing the two commercial climate zones in Arkansas that apply to Chapter 5 of the 2009 IECC and ASHRAE 90.1-2007.

Arkansas Climate Zones for Residential Construction. Applies to Commercial Construction up to 12/31/2012

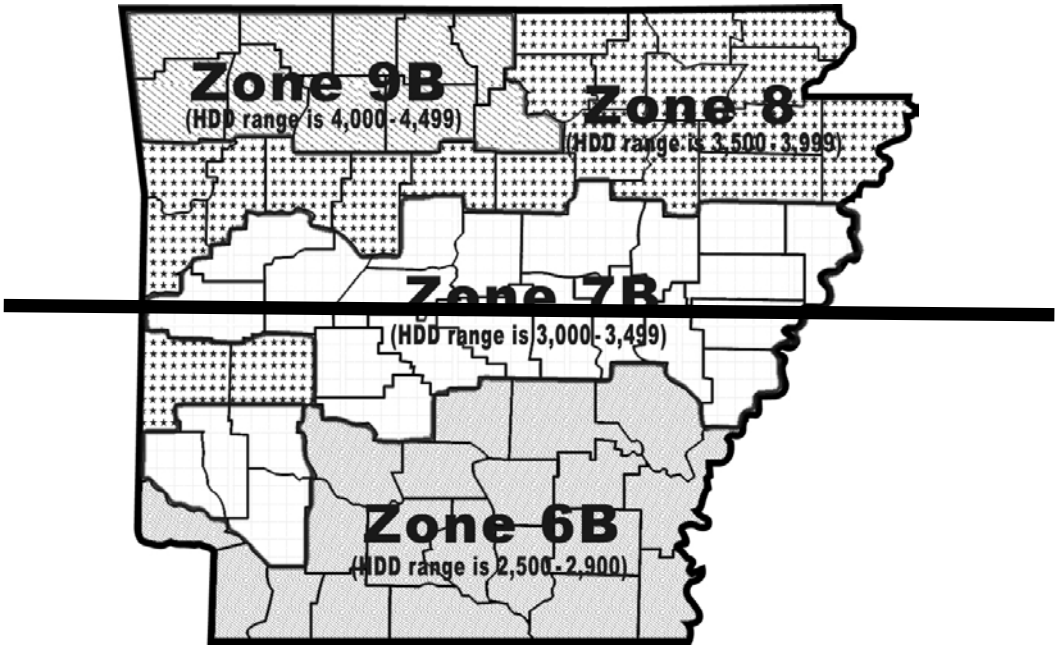


FIGURE 302.1(1)
ARKANSAS

Zone	County
6B	Arkansas (H)
6B	Ashley (H)
9B	Baxter
9B	Benton
9B	Boone
6B	Bradley (H)
6B	Calhoun (H)
9B	Carroll
6B	Chicot (H)
6B	Clark (H)
8	Clay
8	Cleburne
6B	Cleveland (H)
6B	Columbia (H)
7B	Conway (H)
8	Craighead
8	Crawford
7B	Crittenden (H)
7B	Cross (H)
6B	Dallas (H)
6B	Desha (H)
6B	Drew (H)
7B	Faulkner (H)
8	Franklin
8	Fulton
7B	Garland (H)
6B	Grant (H)
8	Greene
7B	Hempstead (H)
7B	Hot Spring (H)
7B	Howard (H)
8	Independence
8	Izard
8	Jackson
6B	Jefferson (H)
8	Johnson
6B	Lafayette (H)
8	Lawrence
7B	Lee (H)
6B	Lincoln (H)
6B	Little River (H)
7B	Logan (H)
7B	Lonoke (H)
9B	Madison
9B	Marion
6B	Miller (H)
8	Mississippi
7B	Monroe (H)
8	Montgomery
6B	Nevada (H)
9B	Newton
6B	Ouachita (H)
7B	Perry (H)
7B	Phillips (H)
7B	Pike (H)
8	Poinsett
8	Polk
8	Pope
7B	Prairie (H)
7B	Pulaski (H)
8	Randolph
7B	Saline (H)
7B	Scott (H)
9B	Searcy
8	Sebastian
7B	Sevier (H)
8	Sharp
7B	St Francis (H)
9B	Stone
6B	Union (H)
8	Van Buren
9B	Washington
7B	White (H)
7B	Woodruff (H)
7B	Yell (H)

Table 302.2 Arkansas HDD* and zones

Zone	HDD
6B	2,500 – 2,999
7B	3,000 – 3,499
8	3,500 – 3,999
9B	4,000 – 4,499

* HDD = Heating Degree Days

Note: Counties identified with (H) shall be considered "hot and humid climate areas" for purposes of the application of Section 502.1.1.

CHAPTER 4
RESIDENTIAL BUILDING DESIGN BY SYSTEMS ANALYSIS AND DESIGN OF BUILDINGS UTILIZING RENEWABLE ENERGY SOURCES

* Delete Section 402.2.3.1.3 FENESTRATION SYSTEM SOLAR HEAT GAIN COEFFICIENT, STANDARD DESIGN without substitution.

CHAPTER 5
RESIDENTIAL BUILDING DESIGN BY COMPONENT PERFORMANCE APPROACH

* Revise Exception 2 in Section 502.1.1 MOISTURE CONTROL as follows:

2. Vapor retarders shall not be required where the county in which the building is being constructed is considered a hot and humid climate area and identified as such in Figure 302.1(1).

* Delete Section 502.1.5 FENESTRATION SOLAR HEAT GAIN COEFFICIENT without substitution.

* Revise Table 503.3.3.3 MINIMUM DUCT INSULATION as follows:

TABLE 503.3.3.3
MINIMUM DUCT INSULATION [a]

ANNUAL HEATING DEGREE DAYS	Insulation *R*-value [d]			
	Ducts in unconditioned attics or outside building		Ducts in unconditioned basements, crawl spaces, garages, and other unconditioned spaces [e]	
	Supply	Return	Supply	Return
< 1,500	8	4	4	0
1,500 to 3,500	5.6	5.6	5.6	5.6
3,501 to 7,500	5.6	5.6	5.6	5.6
> 7,500	11	6	11	2

* Delete footnote b in Table 503.3.3.3 without substitution.

SECTION 503
BUILDING MECHANICAL SYSTEMS AND EQUIPMENT

* Replace the *International Mechanical Code* with the *Arkansas Mechanical Code* in Sections 503.3.3.4 DUCT CONSTRUCTION, 503.3.3.4.1 HIGH AND MEDIUM PRESSURE DUCT SYSTEMS and 503.3.3.4.2 LOW PRESSURE DUCT SYSTEMS.

CHAPTER 6
SIMPLIFIED PRESCRIPTIVE REQUIREMENTS FOR DETACHED ONE- AND TWO-FAMILY DWELLINGS AND GROUP R-2, R-4 OR TOWNHOUSE RESIDENTIAL BUILDINGS

* Revise Section 601.2 COMPLIANCE to include deemed to comply tools that are approved by the Arkansas Energy Office.

601.2 Compliance. Compliance shall be demonstrated in accordance with Section 601.2.1 or 601.2.2. Deemed to comply tools that are approved by the Arkansas Energy Office shall be permitted to demonstrate compliance.

* Revise Section 601.3.2.1 DEFAULT FENESTRATION PERFORMANCE as follows:

601.3.2.1 Default fenestration performance. Where a manufacturer has not determined a fenestration product's *U*-factor in accordance with NFRC 100, compliance shall be determined by assigning such products a default *U*-factor from Tables 102.5.2(1) and 102.5.2(2).

* Modify Exception in Section 602.1.6 SLAB-ON-GRADE FLOORS as follows:

Exception: Slab perimeter insulation is not required for unheated slabs in areas of moderate to very heavy termite infestation probability as shown in Figure 502.2(7). Where this exception is used, building envelope compliance shall be demonstrated by using Section 502.2.2 or Chapter 4 with the actual "Slab perimeter *R*-value and depth" in Table 602.1, or by using Section 502.2.4.

* Delete Section 602.2 MAXIMUM SOLAR HEAT GAIN COEFFICIENT FOR FENESTRATION PRODUCTS without substitution.

CHAPTER 7
BUILDING DESIGN FOR ALL COMMERCIAL BUILDINGS

* Chapter 7 will be in effect until 12/31/2012. Revise ASHRAE/IESNA 90.1 to ANSI/ASHRAE/IESNA 90.1-2001 in the following section:

701.1 Scope. Until 12/31/2012 commercial buildings shall meet the requirements of ANSI/ASHRAE/IESNA 90.1-2001. On and after 1/1/2013 commercial buildings shall meet the requirements of ANSI/ASHRAE/IESNA 90.1-2007 with the following exception.

Exception: Commercial buildings that comply with Chapter 5 in the 2009 IECC with its associated definitions, general requirements and reference standards.

Chapter 8 of the 2003 IECC is in effect until 12/31/2012. On and after 1/1/2013 Chapter 8 is removed in its entirety and replaced with Chapter 5 of the 2009 International Energy Conservation Code (2009 IECC) with its associated definitions, general requirements and referenced standards.

CHAPTER 8—In effect until 12/31/2012
DESIGN BY ACCEPTABLE PRACTICE FOR COMMERCIAL BUILDINGS

* Replace the *International Mechanical Code* with the *Arkansas Mechanical Code* in Sections 803.2.5 VENTILATION, 803.2.6 COOLING WITH OUTDOOR AIR, 803.2.8.1 DUCT CONSTRUCTION, 803.2.8.1.1 HIGH- AND MEDIUM-PRESSURE DUCT SYSTEMS, 803.2.8.1.2 LOW-PRESSURE DUCT SYSTEMS, 803.3.4 REQUIREMENTS FOR COMPLEX MECHANICAL SYSTEMS SERVING MULTIPLE ZONES, and 803.3.8.1 AIR SYSTEM BALANCING.

***** Replace ASHRAE/IESNA 90.1 with ANSI/ASHRAE/IESNA 90.1-2001 in Sections 801.2 APPLICATIONS, SECTION 802 BUILDING ENVELOPE REQUIREMENTS, 802.1 GENERAL, and 802.2 CRITERIA.

Arkansas Commercial Climate Zones
in effect on and after 1/1/2013

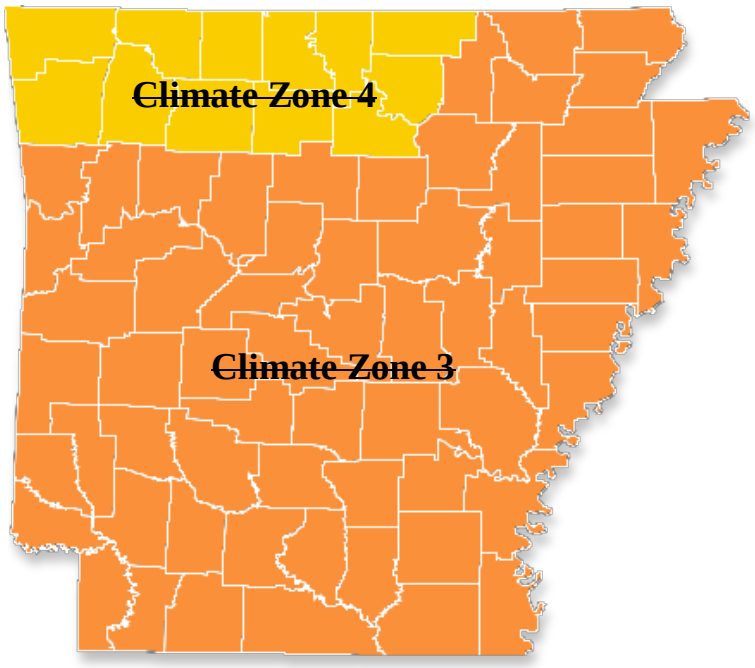


FIGURE 501.3
ARKANSAS COMMERCIAL CLIMATE ZONES

Climate Zones 3 and 4 are referenced in ANSI/ASHRAE/IESNA 90.1-2007 and Chapter 5 of the 2009 International Energy Conservation Code. These codes take effect on and after 1/1/2013.

Climate Zone 4 contains counties of Baxter, Benton, Boone, Carroll, Fulton, Izard, Madison, Marion, Newton, Search, Stone and Washington.

Climate Zone 3 contains counties of Arkansas, Ashley, Bradley, Calhoun, Chicot, Clark, Clay, Cleburne, Cleveland, Columbia, Conway, Craighead, Crawford, Crittenden, Dross, Dallas, Desha, Drew, Faulkner, Franklin, Garland, Grant, Greene, Hempstead, Hot Spring, Howard, Independence, Jackson, Jefferson, Johnson, Lafayette, Lawrence, Lee, Lincoln, Little River, Logan, Lonoke, Miller, Mississippi, Monroe, Montgomery, Nevada, Ouachita, Perry, Phillips, Pike, Poinsett, Polk, Pope, Prairie, Pulaski, Randolph, Saline, Scott, Sebastian, Sevier, Sharp, St. Francis, Union, Van Buren, White, Woodruff and Yell.

CHAPTER 10
REFERENCED STANDARDS

* Revise Chapter 10 REFERENCED STANDARDS to include the following:

AFC

Arkansas Fire Prevention Code
State Fire Marshal's Office
#1 State Police Plaza Dr
Little Rock, AR 72209
(501) 618-8624
Fax (501) 618-8621

Standard Reference Number	Title	Referenced in Code Section Number
AFC	.....	104.3

AMC

Arkansas Mechanical Code
Department of Health
Division of Protective Health Codes
4815 West Markham Street, Slot 24
Little Rock, AR 72205-3867
(501) 661-2642
Fax (501) 661-2671
http://www.healthy.arkansas.gov/programsServices/environmentalHealth/ProtectiveHealthCodes/Pages/default.aspx

Standard Reference Number	Title	Referenced in Code Section Number
AMC		The following references apply to the residential section of the 2003 IECC: 503.3.3.4, 503.3.3.4.1 and 503.3.3.4.2. The following references apply to the commercial section of the 2003 IECC and will be in effect until 12/31/2012. 803.2.5, 803.2.6, 803.2.8.1, 803.2.8.1.1, 803.2.8.1.2, 803.3.4 803.3.8.1. The following references apply to the commercial section of the 2009 IECC and will be in effect on and after 1/1/2013: 503.2.5, 503.2.5.1, 503.2.6, 503.2.7, 503.2.7.1, 503.2.7.1.1, 503.2.7.1.2, 503.2.9.1, 503.3.1 and 503.4.5.

Arkansas Energy Code for New Building Construction Supplements and Amendments

2014

ARKANSAS
Economic Development Commission
ENERGY OFFICE

Arkansas Economic Development Commission – Energy Office
900 West Capitol Avenue
Little Rock, Arkansas 72113
501-682-6103
www.arkansasenergy.org

Contents

Introduction

The Arkansas General Assembly authorized the Arkansas Economic Development Commission - Energy Office to promulgate these regulations in Section 3(B)(2)(c) of Act 7 of 1981. These rules and regulations are in adherence with the Administrative Procedures Act. The *2014 Arkansas Energy Code for New Building Construction* establishes minimum energy requirements for residential and commercial buildings in the State of Arkansas.

Residential and Commercial

For residential and commercial structures, Arkansas adopts the International Energy Conservation Code (IECC), 2009 Edition, published and copyrighted by the International Codes Council.

To order copies of the *International Energy Conservation Code 2009 Edition* contact:

International Code Council
900 Montclair Road
Birmingham, Alabama 35213-1206
Phone: 1-800-786-4452, Fax: 205-591-0775
Telecommunications Device for the Deaf: 205-599-9742

Web: www.iccsafe.org

Commercial

Chapter 5 of the IECC 2009 allows for an alternative compliance pathway for commercial structures through the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) ANSI / ASHRAE /IESNA Standard 90.1-2007 Energy Standard for Buildings Except Low-Rise Residential Buildings. Both standards are available separately or in a bundled edition from the International Code Council at the above address.

To order copies of *American Society of Heating, Refrigerating, and Air-Conditioning Engineers ANSI/ASHRAE/IESNA Standard 90.1-2007* contact:

American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc.
1791 Tullie Circle, N.E.
Atlanta, Georgia 30329
Phone: 404-636-8400, Fax: 404-321-5478
Web: www.ashrae.org

Questions, inquiries or request for copies of the *2014 Arkansas Energy Code for New Building Construction Supplements and Amendments* may be addressed to:

Arkansas Economic Development Commission - Energy Office
Attn: *2014 Arkansas Energy Code for New Building Construction*
900 West Capitol Avenue
Little Rock, Arkansas 72201
Phone: 800-558-2633 or 501-682-6103, Fax: 501-682-7499
Email: EnergyInfo@ArkansasEDC.com

Overview

The INTERNATIONAL ENERGY CONSERVATION CODE, 2009 Edition (IECC 2009), published by the International Code Council, when used in conjunction with these State of Arkansas Supplements and these Amendments to the Arkansas Energy Code for New Building Construction shall constitute the *2014 Arkansas Energy Code*. In cases where there are differences between these "Supplements and Amendments" and the IECC 2009 Edition, these "Supplements and Amendments" shall take precedence.

Each of the following Chapters of this document associates directly with the corresponding chapters of the IECC 2009 unless otherwise noted.

Air infiltration accounts for substantial heat loss, heat gain and moisture migration in a building. Proper sealing around all doors, windows and other envelope penetrations through the walls, ceiling and foundation is as important to code compliance as are proper insulation R-values and assembly U-factors.

It is not the intention of this Code to abridge safety or health.
New buildings constructed shall comply with the provisions of this Code in a manner consistent with their obligations under Arkansas State law (see also the current version of the Arkansas Fire Prevention Code, Volume I Fire, Volume II Building).

These minimum standards shall not be construed as relieving the licensed builder or contractor of his or her responsibility for compliance with local ordinance, codes and regulations.

Arkansas Amendments

**Revise the International Energy Conservation Code, 2009 Edition, as follows:*

Chapter 1: Administration

CHAPTER 1
ADMINISTRATION

SECTION 101.1
SCOPE AND GENERAL REQUIREMENTS

***Delete 'Title' and replace with the following:**

101.1 Title. This Code shall be known as the *2014 Arkansas Energy Code for New Building Construction* and shall be cited as such. It is referred to herein as "this Code" or "the Arkansas Energy Code."

***Revise 101.5.1 'Compliance materials' to read as follows:**

101.5.2 Compliance materials. Compliance pathways for residential and commercial construction are those delineated in Chapter 4 and Chapter 5 respectively. Computer aided tools such as REScheck, RESNET Home Energy Rating System and COMcheck are also acceptable. Other tools and third-party services may be approved by the Arkansas Economic Development Commission – Energy Office.

A label as outlined in 401.3 is required to be posted on new residential construction.

REScheck and COMcheck are computer programs developed by Pacific Northwest National Laboratories for the U.S. Department of Energy (D.O.E.) to assist in demonstration of compliance with the IECC. They may be obtained free of charge from the D.O.E. online at www.energycodes.gov. When following the REScheck compliance pathway, select the appropriate version.

***Revise 101.5.2 "Low energy buildings' to add the following to the list of exempt buildings:**

3. Temporary use structures such as hunting and fishing camps, boat houses, remote cabins, etc. that do not meet the definition of "dwelling units" in Section 202; General Definitions.

4. Mobile homes and manufactured housing.

SECTION 102 ALTERNATE MATERIALS – METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEMS
PART 2 – ADMINISTRATION AND ENFORCEMENT

SECTION 103 CONSTRUCTION DOCUMENTS

***Add section 103.6 'Design Professional' as follows:**

103.6 Design Professional: Architects and engineers employed to prepare plans and specifications for new buildings shall ensure the plans and specifications comply with the provisions of this Code in a manner consistent with their obligations under Arkansas State law (see also the current version of the Arkansas Fire Prevention Code, Volume I Fire, Volume II Building).

SECTION 104
INSPECTIONS

***Revise Section 104 'Inspections' as follows:**

104.1 General. Construction or work that must comply with this Code shall be subject to inspection by the Arkansas Economic Development Commission - Energy Office or its agent, or by the code official.

104.2 Final inspection. *Code officials* within a county or municipality who have adopted this Code and conduct final inspections as a part of their normal operations shall perform a final inspection and approval for buildings when completed and ready for occupancy.

104.3 Re-inspection. The Arkansas Economic Development Commission - Energy Office or its agent or *code official* may cause a structure to be re-inspected.

SECTION 110
ENFORCEMENT

***Add Section 110 'Enforcement and Adoption' as follows:**

110.1 General. Enforcement of this Code shall be the responsibility of the Arkansas Economic Development Commission - Energy Office or local government.

110.2 Local Government. All counties, cities or municipalities that issue building permits for new building construction are required to adopt this Code for new construction, additions and renovation of existing structures. However, the local municipality shall not in any way modify the energy conservation standards in this Code or promulgate or adopt rules or regulations that are less stringent than this Code.

A local government may exercise other administrative and enforcement procedures that it deems necessary to affect the purposes of this Code, including, but not limited to, prior plan approval, building permit requirements, and inspections during the course of construction.

SECTION 111
Adoption

***Add Section 111 'Adoption' as follows:**

111.1 Adoption. Arkansas Code § 15-10-205(b)(3)(B) requires that any city or county in Arkansas which issues building permits for new building construction (referred to herein as "applicable cities or counties") shall adopt the Arkansas Energy Code as amended.

111.1.1 Date of adoption: Applicable cities or counties shall adopt the Arkansas Energy Code prior to 12/31/2014.

111.1.2 Acknowledgement of Adoption. Upon adoption of the Arkansas Energy Code, applicable cities or counties are required to submit a copy of the adoption ordinance to the Arkansas Economic Development Commission - Energy Office. If the applicable city or county has not adopted the Arkansas Energy Code by 12/31/2014 the mayor and/or county judge is required to submit a letter to the Arkansas Economic Development Commission - Energy Office, no later than 60 days after this deadline, describing why the city or county is not in compliance with Arkansas Code § 15-10-205(b)(3)(B).

SECTION 112
EFFECTIVE DATE

***Add Section 112 'Effective Date' as follows:**

112.1 The effective date for this Code shall be is 1/1/2015.

Chapter 2: Definitions

CHAPTER 2 DEFINITIONS

SECTION 202
GENERAL DEFINITIONS

***Revise Section 202 GENERAL DEFINITIONS to include the following:**

EFFICIENCY, HVAC SYSTEM. The ratio of useful energy output (at the point of use) to the energy input in consistent units for a designated time period, expressed in percent.

Arkansas Economic Development Commission - Energy Office

RECOOLING. The removal of heat by sensible cooling of the supply air (directly or indirectly) which has been previously heated above the temperature to which the air is to be supplied to the conditioned space for proper control of the temperature of that space.

RECOVERED ENERGY. Energy utilized which would otherwise be wasted (i.e., not contribute to a desired end use) from an energy utilization system.

RESET. Adjustment of the set point of a control instrument to a higher or lower value automatically or manually to conserve energy.

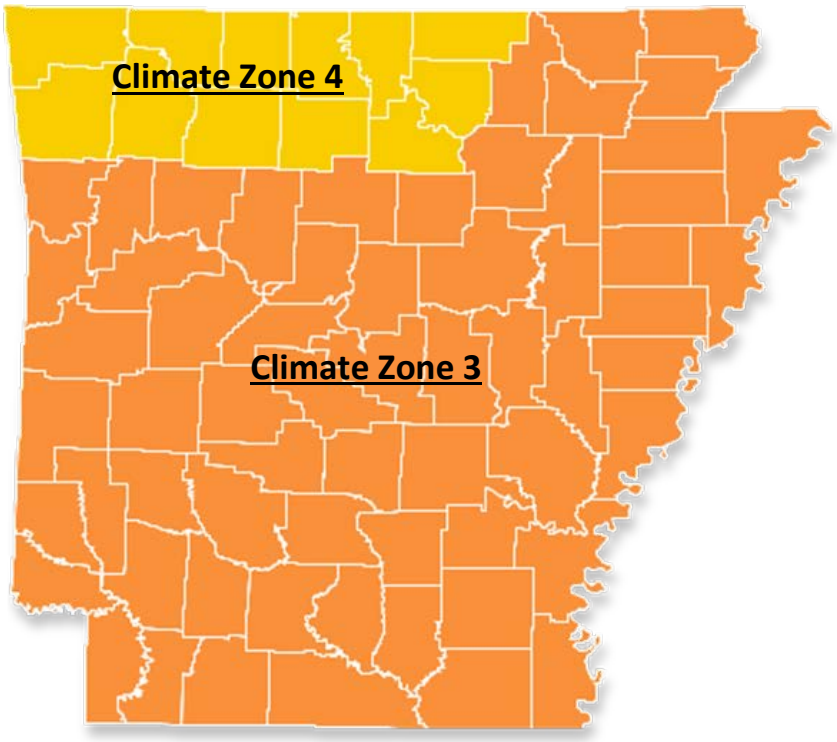
Chapter 3: Climate Zones

CHAPTER 3
CLIMATE ZONES

SECTION 301
CLIMATE ZONES

*Replace Figure 301.1 with the following:

Figure301.1 Arkansas Climate Zones



*Revise Table 301.1 to include on Arkansas-specific information as follows:

TABLE 301.1
CLIMATE ZONES, MOISTURE REGINES, AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

Climate Zone 4 contains counties of Baxter, Benton, Boone, Carroll, Fulton, Izard, Madison, Marion, Newton, Search, Stone and Washington.

Climate Zone 3 contains counties of Arkansas, Ashley, Bradley, Calhoun, Chicot, Clark, Clay, Cleburne, Cleveland, Columbia, Conway, Craighead, Crawford, Crittenden, Dross, Dallas, Desha, Drew, Faulkner, Franklin, Garland, Grant, Greene, Hempstead, Hot Spring, Howard, Independence, Jackson, Jefferson, Johnson, Lafayette, Lawrence, Lee, Lincoln, Little River, Logan, Lonoke, Miller, Mississippi, Monroe, Montgomery, Nevada, Ouachita, Perry, Phillips, Pike, Poinsett, Polk, Pope, Prairie, Pulaski, Randolph, Saline, Scott, Sebastian, Sevier, Sharp, St. Francis, Union, Van Buren, White, Woodruff and Yell.

Chapter 4: Residential Energy Efficiency

CHAPTER 4
RESIDENTIAL ENERGY EFFICIENCY

SECTION 401
GENERAL

Arkansas Economic Development Commission - Energy Office

Revise 401.3 'Certificate.' as follows:

401.3 Label. A permanent label shall be posted on or in the electrical distribution panel. A temporary, but identical, label shall be posted on a clearly visible location for consumers on or in close proximity to the front door of the home. The temporary label shall remain affixed until purchase of the home. The permanent label shall not cover or obstruct the visibility of the circuit directory label service disconnect label or other required labels. The label shall be completed by the builder. The certificate shall list the predominant R-values of insulation installed in the or on the ceiling/roof, walls, foundation (slab, basement wall, crawlspace wall and/or floor) and ducts outside conditioned spaces; U-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration. Where there is more than one value for each component, the label shall list the value covering the largest area. The label shall list the types and efficiencies of heating, cooling and service water heating equipment. Where a gas-direct unvented room heater, electric furnace or baseboard electric heater is installed in the resident, the label shall list "gas-fired unvented room heater," "electric furnace' or "baseboard electric heater," as appropriate. An efficiency rating shall not be listed for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters. The label shall include the completion date, builder company name and the license number assigned by the Arkansas Contractor's Licensing Board. The label will serve as an indication the home, at the time of completion, is in compliance with this Code. Copies of this label shall also be provided to the lender and appraiser. If requested, copies shall be provided to realtors and others stakeholders involved with the transaction.

401.3.1 Label maintenance. The Arkansas Economic Development Commission - Energy Office shall create and maintain the label. Alterations by the Arkansas Economic Development Commission - Energy Office to this label cannot increase or decrease the stringency of the standards reflected in this Code. The version number of the label must be clearly stated in the bottom left corner of the label. The label can include other energy related information from various rating systems, designations and local utility programs. The label must be made available by the Arkansas Economic Development Commission - Energy Office to the public on its website, through E-mail and by other means.

SECTION 402
BUILDING THERMAL ENVELOPE

***Revise Table 402.1.1, 'INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]' as follows:**

Revise values for Climate Zone 4 with the values below.

CLIMATE ZONE	FENSTRATION U-FACTOR[b]	SKYLIGHT[b] *U*- FACTOR	SKYLIGHT GLAZED FENESTRATION SHGC[b, e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL R-VALUE[i]	FLOOR R-VALUE	BASEMENT[b] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
4 except Marine	.50	.65	.30	30	13	5/10	19	10/13	0	5/13

SECTION 403
SYSTEMS

***Delete Section 403.1.1, 'Programmable thermostat.'**

***Add new Section 403.2.1.1 'Spray foam insulation.'**

403.2.1.1 Spray foam insulation. Spray application of polyurethane foam to the exterior of ducts in attics and crawl spaces shall be permitted subject to all of the following:

1. The flame spread index is not greater than 25 and the smoke-developed index is not greater than 450 at the specified installed thickness.
2. The foam plastic is protected in accordance with the ignition barrier requirements.
3. The foam plastic complies with the requirements of Section R316.
4. Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C 411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F (121°C). Coverings and linings shall be listed and labeled.
5. External duct insulation and factory-insulated flexible ducts shall be legibly printed or identified at intervals not longer than 36 inches (914 mm) with the name of the manufacturer, the thermal resistance R-value at the specified installed thickness and the flame spread and smoke-developed indexes of the composite materials. Spray polyurethane foam manufacturers shall provide the same product information and properties, at the nominal installed thickness, to the customer in writing at the time of foam application. All duct insulation product R-values shall be based on insulation only, excluding air films, vapor retarders or other duct components, and shall be based on tested C-values at 75°F (24°C) mean temperature at the installed thickness, in accordance with recognized industry procedures. The installed thickness of duct insulation used to determine its R-value shall be determined as follows:
6. For duct board, duct liner and factory-made rigid ducts not normally subjected to compression, the nominal insulation thickness shall be used.
7. For ductwrap, the installed thickness shall be assumed to be 75 percent (25-percent compression) of nominal thickness.
8. For factory-made flexible air ducts, the installed thickness shall be determined by dividing the difference between the actual outside diameter and nominal inside diameter by two.

9. For spray polyurethane foam, the aged R-value per inch measured in accordance with recognized industry standards shall be provided to the customer in writing at the time of foam application. In addition, the total R-value for the nominal application thickness shall be provided.

This section supersedes the 2010 Arkansas Mechanical Code.

***Revise section 403.2.2 Sealing (Mandatory) as follows:**

403.2.2 Sealing (Mandatory). All ducts, air handlers, filter boxes and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.4.1 of the International Residential Code. Verification of compliance with this Section shall be in accordance with either Section 403.2.2.1 or 403.2.2.2.

***Add new section 403.2.2.1 Testing Optional**

403.2.2.1 Testing <u>Option.</u> Duct tightness and insulation installation shall be considered acceptable when it is verified by either of the following:

1. **Postconstruction test:** Leakage to outdoors shall be less than or equal to 8 cfm (226.5 L/min) per 100 ft2 (9.29 m2) of conditioned floor area or a total leakage less than or equal to 12 cfm (12 L/min) per 100 ft2 (9.29 m2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
2. **Rough-in test**: Total leakage shall be less than or equal to 6 cfm (169.9 L/min) per 100 ft2 (9.29 m2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the roughed in system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 ft2 (9.29 m2) of conditioned floor area.

<u>The results from these leakage tests are used at the time of initial inspection only while in the care of the builder. Leakage tests at a later date cannot be used to claim non-compliance with this Code.</u>

Duct tightness shall be considered acceptable with the requirements of Section 403.2.2 are field verified. Where required by the code official, an approved party independent from the installer of the insulation shall inspect the duct sealing.

Exceptions:

1. Duct tightness test is not required if the air handler and all ducts are located within the conditioned space.
2. Duct tightness testing is not required for existing duct systems unless more than 50% of duct system is modified.
3. If the air handler, furnace or evaporator coil is replaced on an existing system, all joints, seams and connections from equipment to duct system and duct system connections to plenums shall meet the sealing requirements of this Code and be verified by a visual inspection by the code official or HVACR installer licensed by the State of Arkansas.

*Revise 403.2.3 ‘Building cavities (Mandatory)’ to read as follows:

403.2.3 Building cavities (Mandatory). Building framing cavities shall not be used as supply or return ducts. All supply and return ducts must be lined with metal, ductboard or other material approved in AMC 603.

***Add new Section 403.2.4, 'Joints and seams', to read as follows:**

403.2.4 Joints and seams. Joints of duct systems shall be made substantially airtight by means of tapes, mastics, liquid sealants, gasketing or other approved closure systems. Without exception all closure systems shall have mastic applied that is at least 0.08 inches (2 mm) thick. Closure systems used with rigid fibrous glass ducts shall comply with UL181A and shall be marked 181A-P for pressure-sensitive tape used with mastic, 181A-M for only mastic or 181 AH for heat-sensitive tape used with mastic. Closure systems used with flexible air ducts and flexible air connectors shall comply with UL181B and shall be marked 181B-FX for pressure sensitive tape used with mastic or 181B-M for only mastic. Duct connections to flanges of air distribution system equipment or sheet metal fittings shall use mastic and be mechanically fastened. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B at least 1-1/2 inches (38 mm) and shall use mastic and be mechanically fastened by means of at least three sheet-metal screws or rivets equally spaced around the joint. Closure systems used to seal metal ductwork shall be installed in accordance with the manufacturer's installation instructions.

Exceptions:

1. Application of spray polyurethane foam insulation and mastic shall be permitted without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect. Mastic must be applied on all accessible sides.
3. Continuously welded or locking type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500Pa) pressure classification shall not require additional closure systems.

***Delete Section 404.1, 'Lighting equipment (Prescriptive)'**

Chapter 5: Commercial Energy Efficiency

CHAPTER 5
COMMERCIAL ENERGY EFFICIENCY

*Replace mentions of the *International Mechanical Code* with the *Arkansas Mechanical Code* in the following in Sections 503.25 'Ventilation', '5013.2.6 'Energy recovery ventilation systems', 503.2.7 'Duct and plenum insulation and sealing', 503.2.7.1 'Duct construction', 503.2.7.1.1 'Low-pressure duct systems', 503.2.7.1.2 'Medium-pressure duct systems', '503.2.9.1 "Air system balancing", 503.3.1 'Economizers', and 503.4.5 'Requirements for complex mechanical systems serving multiple zones."

Chapter 6: Referenced Standards

CHAPTER 6
REFERENCED STANDARDS

*Revise Chapter 6 'Referenced Standards' to include the following:

AFC

Arkansas Fire Prevention Code
State Fire Marshal's Office
1 State Police Plaza Drive
Little Rock, Arkansas 72209
(501) 618-8621

Standard reference number	Title	Referenced in Code section number
AFC	Arkansas Fire Prevention Code……	103.6

AMC

Arkansas Mechanical Code
Department of Health
Division of Protective Health Codes
4815 West Markham Street, Slot 24
Little Rock, Arkansas 72205-3867
(501)661-2642

		Referenced in Code section number
AMC	Arkansas Mechanical Code……..	503.2.5,503.2.5.1, 503.2.6, 503.2.7, 503.2.7.1, 503.2.7.1.1, 503.2.7.1.2, 503.2.9.1, 503.1 and 503.4.5

Appendices

Appendices are not enforceable unless they are specifically referenced in the body of the code or local authority having jurisdiction. These are included to be helpful in meeting and understanding the *2014 Arkansas Energy Code.*

APPENDIX A:

***Add new Appendix A, 'SAMPLE ORDINANCE'**

APPENIX B:

***Add new Appendix B, 'AIR SEALING KEY POINTS'**

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APPPENDIX A: SAMPLE ORDINANCE

ORDINANCE NO. _____

AN ORDINANCE PROVIDING MINIMUM ENERGY STANDARDS FOR THE DESIGN OF NEW BUILDINGS AND STRUCTURES OR PORTIONS AND ADDITIONS TO EXISTING BUILDINGS THAT PROVIDE FACILITIES OR SHELTER FOR PUBLIC ASSEMBLY, EDUCATION, BUSINESS, MERCANTILE, INSTITUTUIONAL, STORAGE, AND RESIDENTIAL OCCUPANCIES, AS WELL AS THOSE PORTIONS OF FACTORY AND INDUSTRIAL OCCUPANCIES DESIGNED PRIMARILY FOR HUMAN OCCUPANCY BY REGULATING THEIR EXTERIOR ENVELOPES AND THE SELECTION OF THEIR HVAC, SERVICE WATER HEATING, ELECTRICAL DISTRIBUTUION AND ILLUMINATING SYSTEMS AND EQUIPMENT FOR EFFECTIVE USE OF ENERGY.

Be in enacted by the City Council of _____, Arkansas,

Section 1. ADOPTION OF ENERGY CODE.

There is hereby adopted by the City Council of _____, Arkansas, for the purpose of establishing rules and regulations for energy efficient standards for new building construction, this Code known as the 2014 Arkansas Energy Code, being particularly the 2014 Arkansas Energy Code edition thereof and the whole thereof, save and except such portions as are hereinafter deleted, modified, or amended, of which not less than three (3) copies of this ordinance, as well as, three (3) copies of the 2014 Arkansas Energy Code, have been and now are filed in the office of the Clerk or Recorder of the city of _____, Arkansas, and the same ordinance is hereby adopted and incorporated as fully as if set out at length herein, and from the date on which this ordinance shall take effect, the provisions thereof shall be controlling in the construction of all buildings and structures therein contained within the corporate limits of the City of _____, Arkansas.

Section 2. INCONSISTENT ORDINANCES REPEALED.

Ordinances or parts thereof in force at the time that this ordinance shall take effect, if inconsistent herewith, are hereby repealed.

Section 3. EMERGENCY CLAUSE.

Whereas it is of the utmost urgency that the city of _____, Arkansas, have an up-to date Energy Code to protect the citizens of our city, therefore, an Emergency is hereby declared to exist and this ordinance being necessary for the immediate protection of the public shall take effect immediately on its passage and approval.

Signed: _____
Mayor
(SEAL)

Attest: _____
City Clerk or Recorder
Date Passed: _____

APPENDIX B: AIR SEALING KEY POINTS

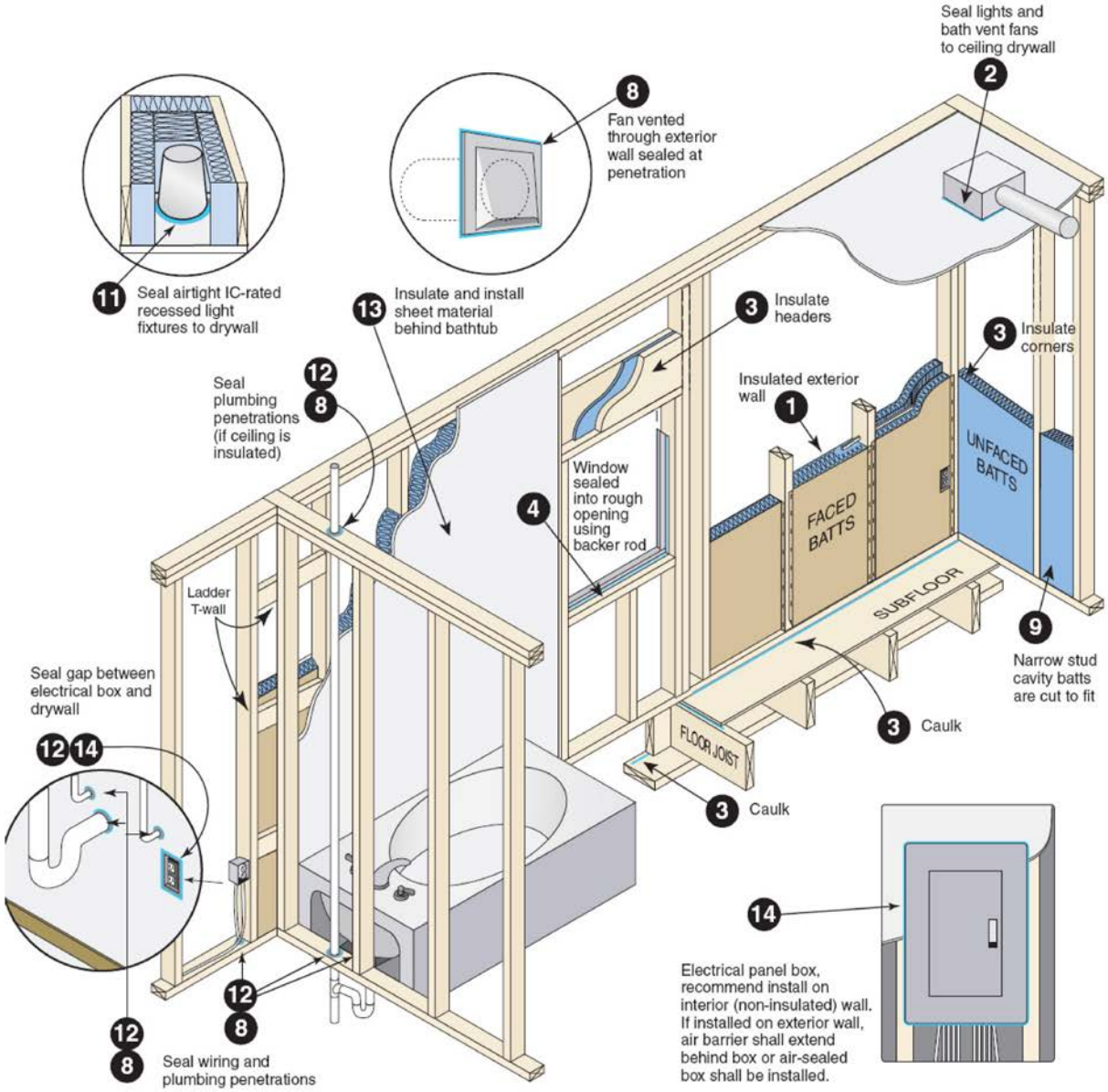
Guide and illustrations provided by Southface Energy Institute, Inc.

Air Barrier and Insulation Inspection Component Guide

NUMBER	COMPONENT	CRITERIA
1	Air barrier and thermal barrier	Exterior thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier. Breaks or joints in the air barrier are filled or repaired. Air-permeable insulation is not used as a sealing material. Air-permeable insulation is inside of an air barrier.
2	Ceiling/attic	Air barrier in any dropped ceiling/soffit is substantially aligned with insulation and any gaps are sealed. Attic access (except unvented attic), knee wall door, or drop down stair is sealed.
3	Walls	Corners and headers are insulated. Junction of foundation and sill plate is sealed.
4	Windows and doors	Space between window/door jambs and framing is sealed.
5	Rim joists	Rim joists are insulated and include an air barrier.
6	Floors (including above-garage and cantilevered floors)	Insulation is installed to maintain permanent contact with underside of subfloor decking. Air barrier is installed at any exposed edge of insulation.
7	Crawl space walls	Insulation is permanently attached to walls. Exposed earth in unvented crawl spaces is covered with Class I vapor retarder with overlapping joints taped.
8	Shafts, penetrations	Duct shafts, utility penetrations, knee walls and flue shafts opening to exterior or unconditioned space are sealed.
9	Narrow cavities	Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed/blown insulation.
10	Garage separation	Air sealing is provided between the garage and conditioned spaces.
11	Recessed lighting	Recessed light fixtures are air tight, IC rated, and sealed to drywall. Exception—fixtures in conditioned space.
12	Plumbing and wiring	Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.
13	Shower/tub on exterior wall	Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.
14	Electrical/phone box on exterior walls	Air barrier extends behind boxes or air sealed-type boxes are installed.
15	Common wall	Air barrier is installed in common wall between dwelling units.
16	HVAC register boots	HVAC register boots that penetrate building envelope are sealed to subfloor or drywall.
17	Fireplace	Fireplace walls include an air barrier.

Disclaimer:
This document is intended solely to help graphically demonstrate the air leakage provisions of section 402.4 of the 2009 IECC. It does not cover all airsealing locations or techniques. Other code provisions may be applicable as well.

Air sealing key points



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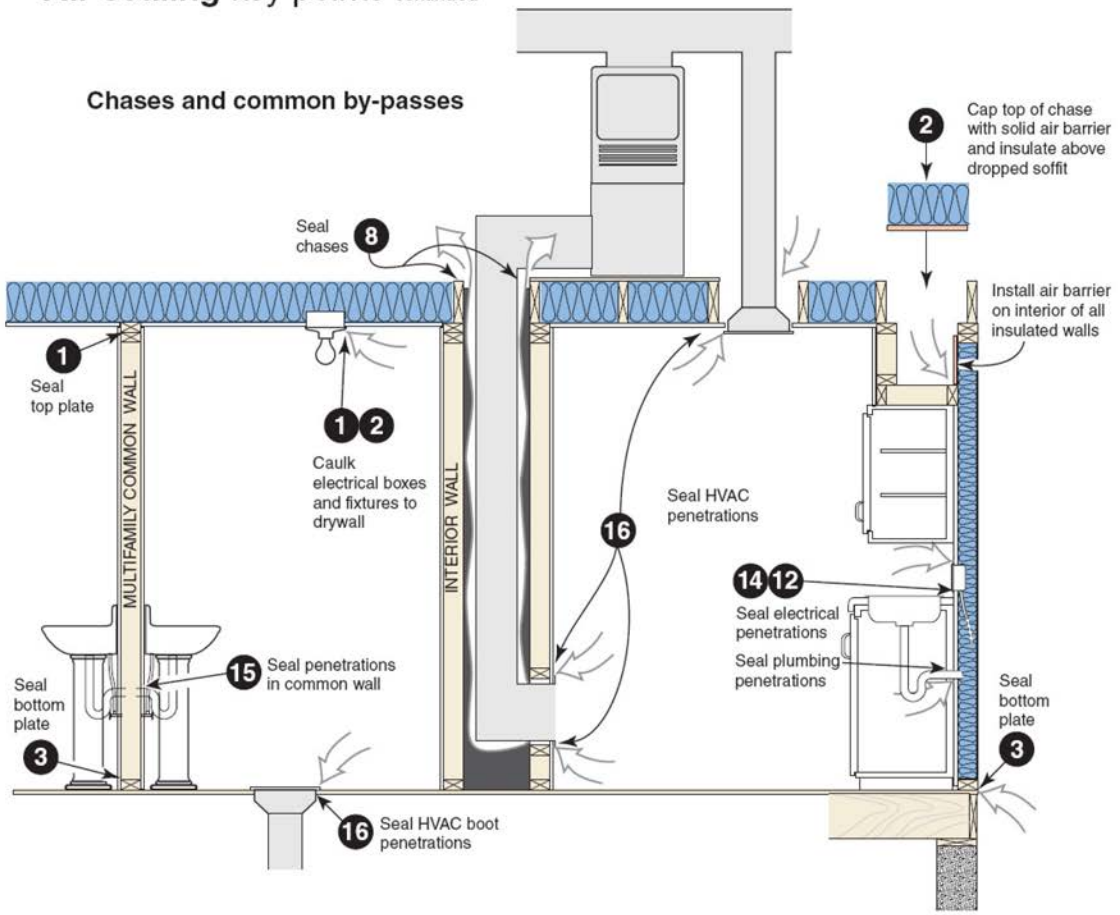
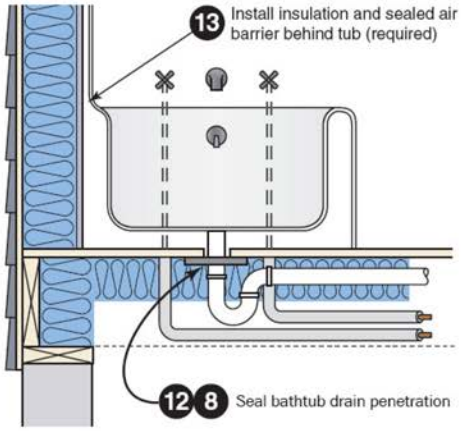
Air sealing key points *continued*

Chases and common by-passes



Shower/tub drain rough opening



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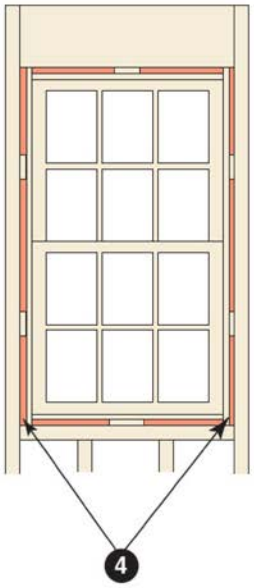
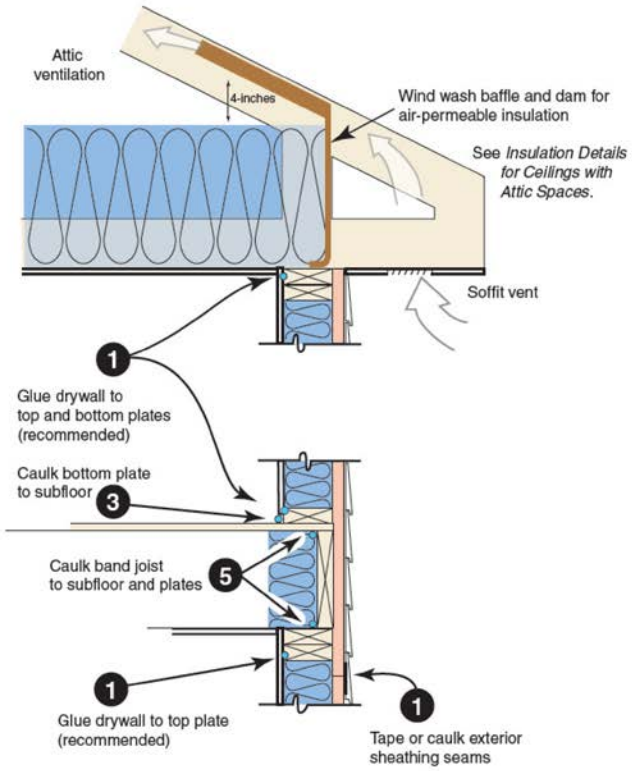
Air sealing key points *continued*

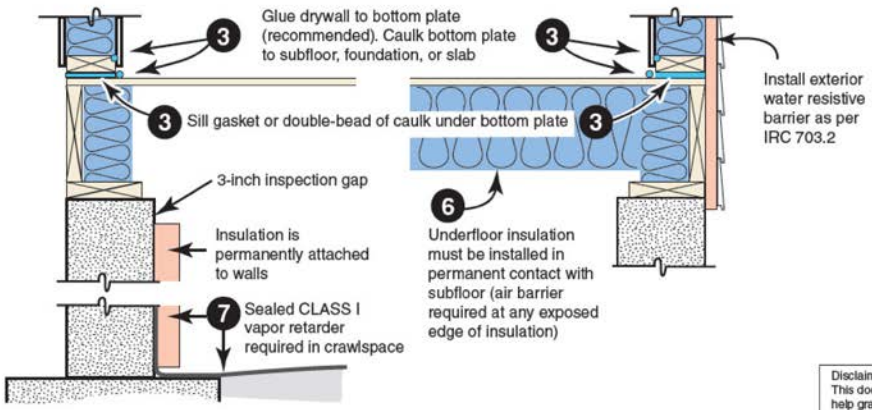
Window rough opening



Use backer rod or spray foam (appropriate for windows) to fill gaps between window/door and rough opening

Wall cross-section





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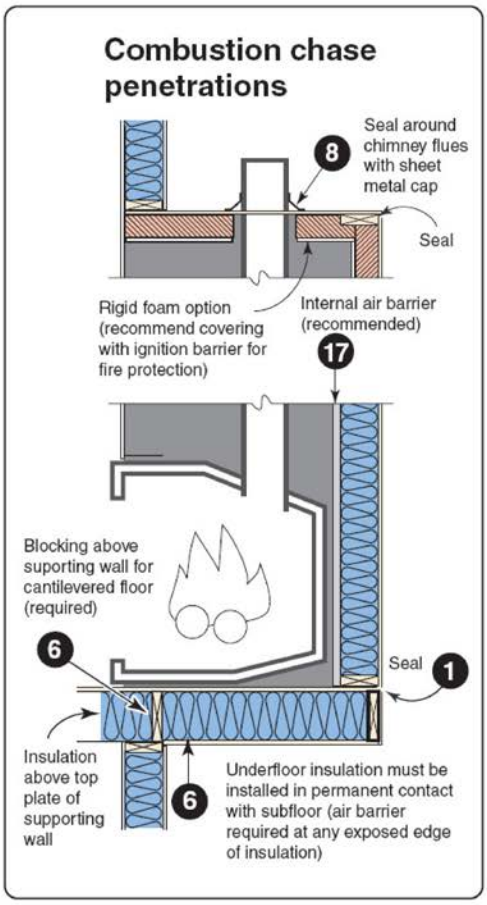
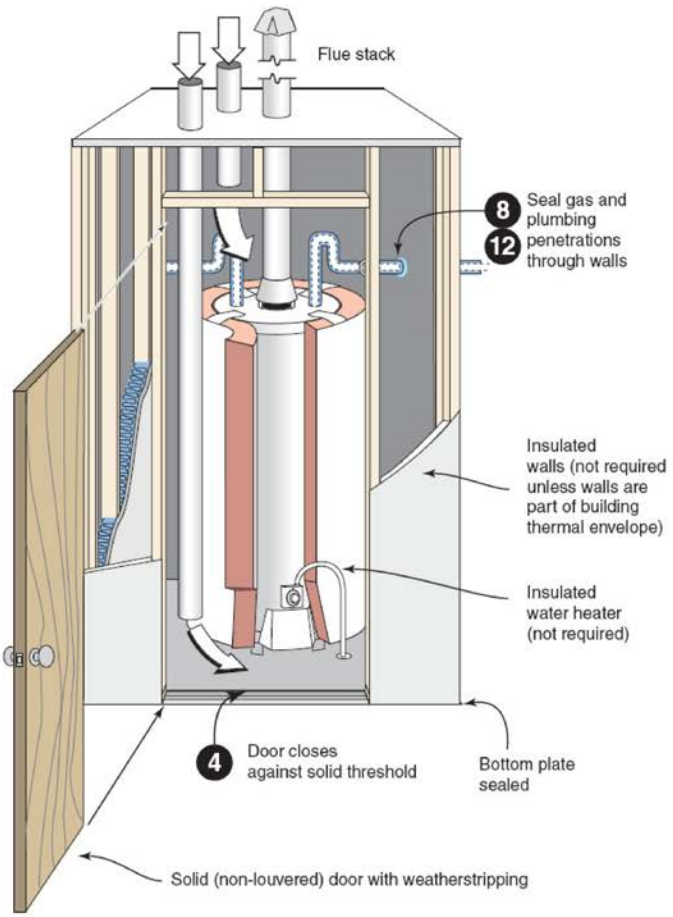
Air sealing key points *continued*

Combustion chase penetrations

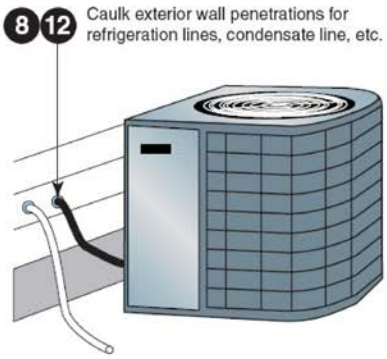


Combustion closet

Combustion air inlets
as per mechanical and/or fuel gas code



Exterior penetrations



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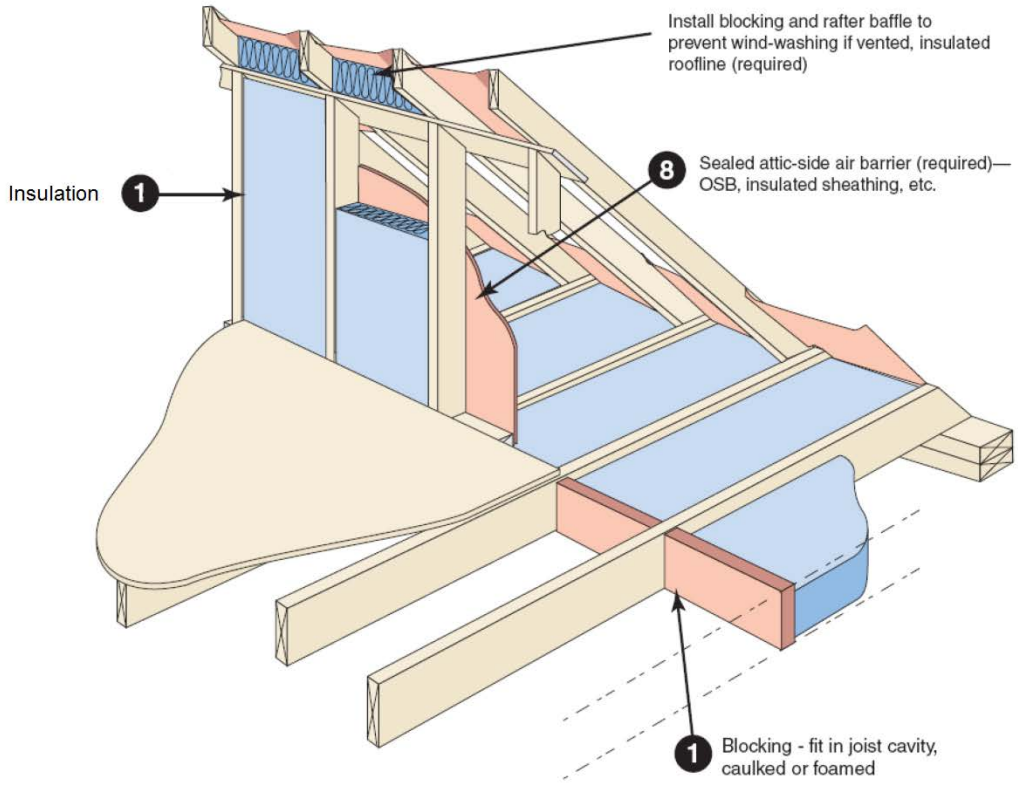
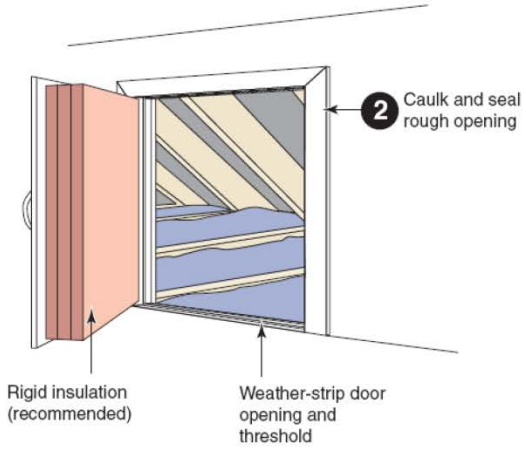
5

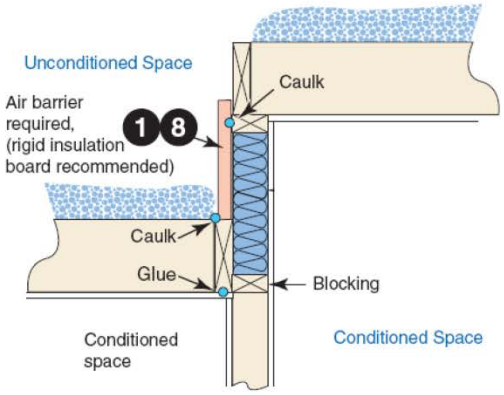
Air sealing key points *continued*



Attic knee-walls



Two-level attic



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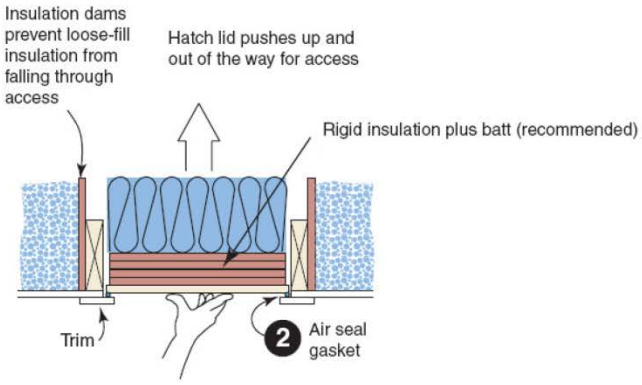
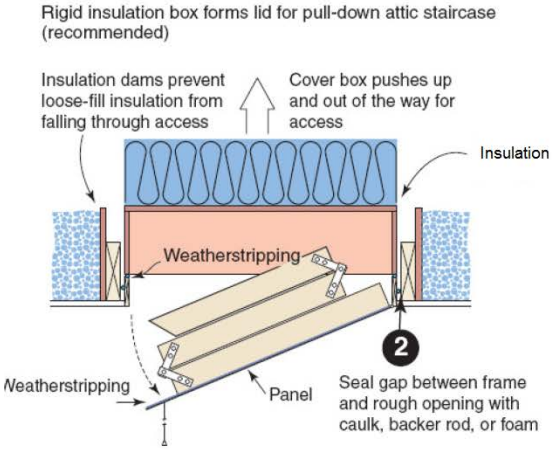
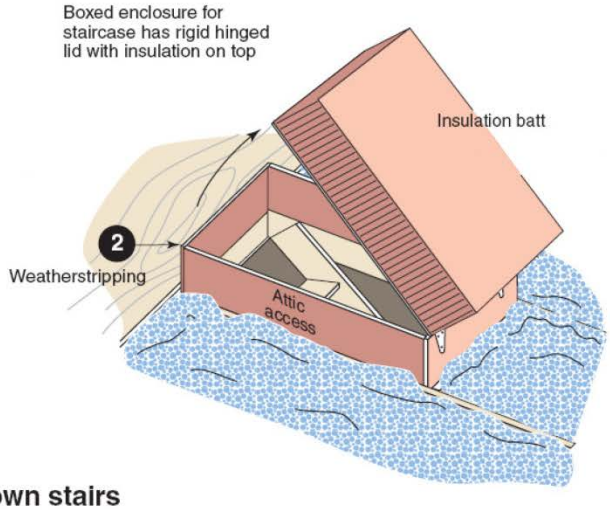
Air sealing key points *continued*

Attic scuttle

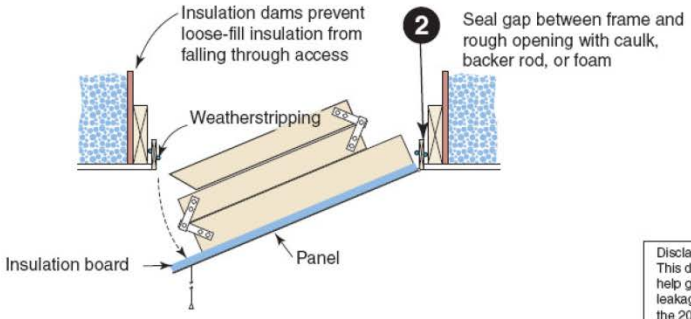


Attic pull-down stairs





Attic pull-down stairs



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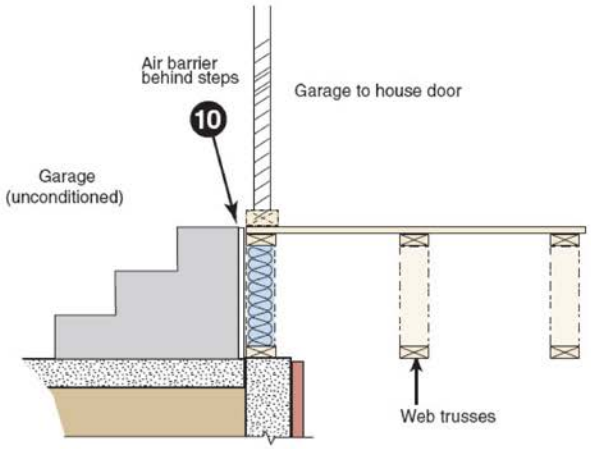
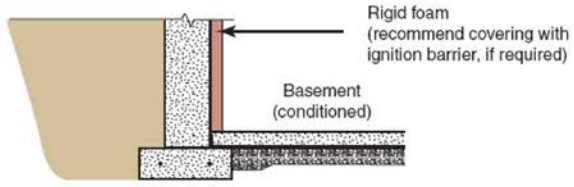
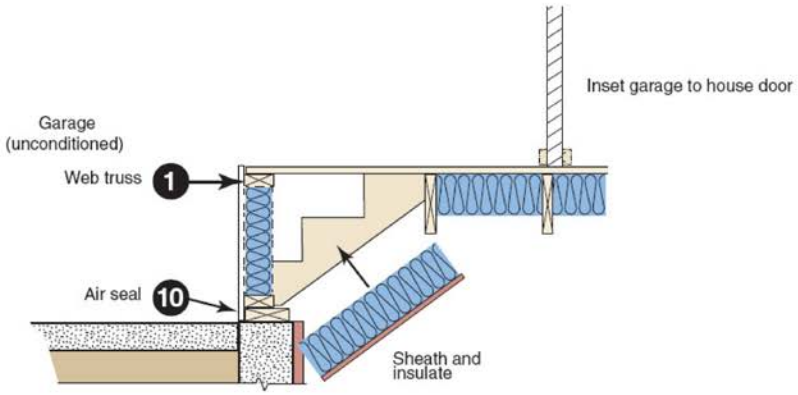
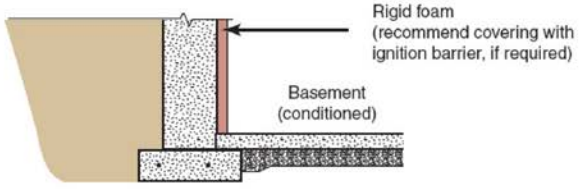
Air sealing key points *continued*









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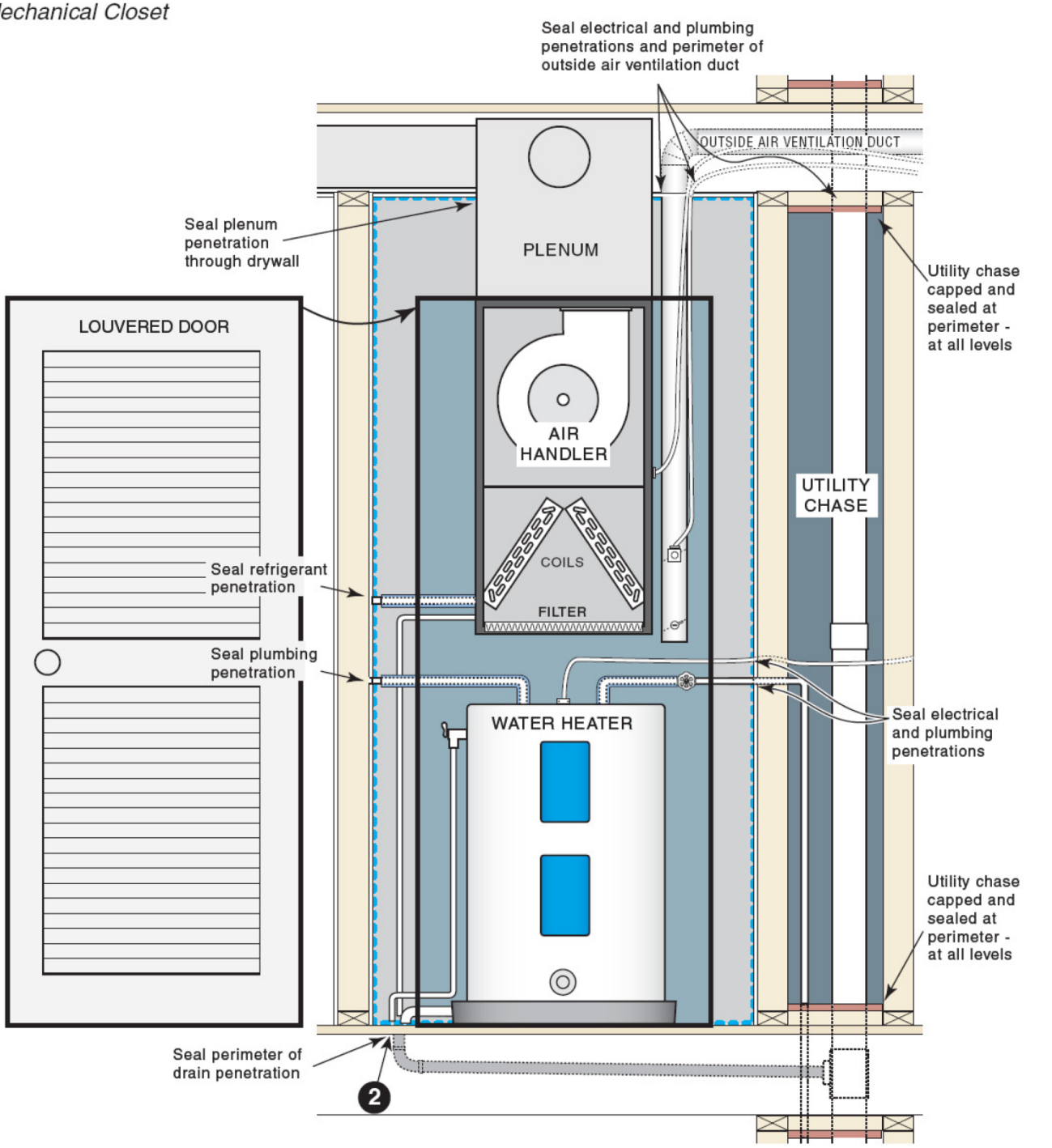
Air sealing key points *continued*

Mechanical Closet



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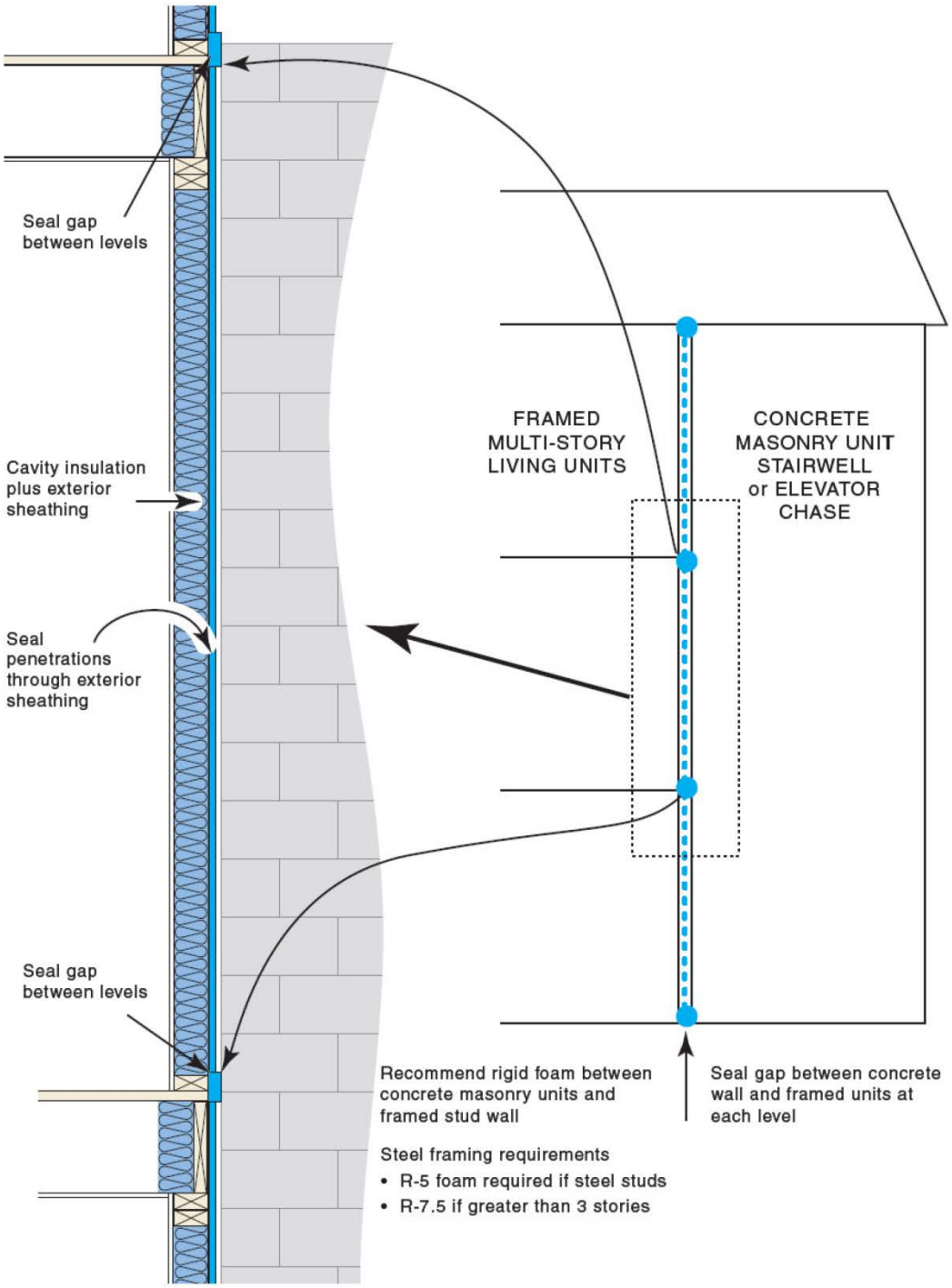
Air sealing key points *continued*

Multifamily



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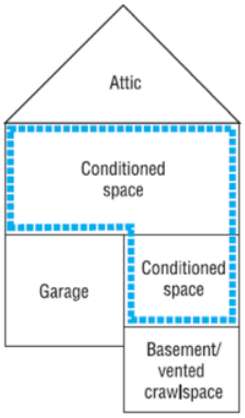
Building Thermal Envelope — The basement walls, exterior walls, floor, roof, and any other building element that enclose conditioned space. This boundary also includes the boundary between conditioned space and any exempt or unconditioned space. *—2009 IECC*

The *building thermal envelope* is the barrier that separates the conditioned space from the outside or unconditioned spaces. The building envelope consists of two parts - an air barrier and a thermal barrier that must be both continuous and contiguous (touching each other). In a typical residence, the building envelope consists of the roof, walls, windows, doors, and foundation. Examples of unconditioned spaces include attics, vented crawlspaces, garages, and basements with ceiling insulation and no HVAC supply registers.

Example 1

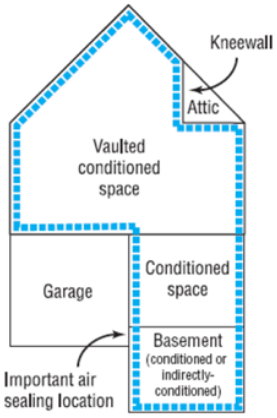


This is a conventional approach that likely locates all ductwork in unconditioned spaces.

Example R-values[1]

- ☐ Flat ceiling: R-30
- ☐ Exterior walls: R-13 + R-3 sheathing
- ☐ Floor over garage and basement/ crawl: R-19
- ☐ Ductwork sealed with mastic and insulated
- ☐ Garage[5], attic and basement/crawl are unconditioned spaces

Example 2

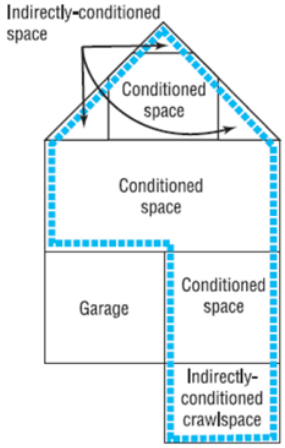


If supply registers deliver conditioned air to basement, it is considered conditioned. With no supply air, it is considered an indirectly-conditioned space.

Example R-values[1]

- ☐ Flat ceiling: R-38
- ☐ Kneewalls[2]: R-18 (required) (R-13+ R-5, R-15 + R-3, R-19 in 2x6)
- ☐ Vaulted ceiling[3]: R-19 air-permeable insulation plus R-5 rigid foam board
- ☐ Exterior walls: R-13
- ☐ Basement masonry walls: R-5
- ☐ Basement slab[4]: R-0
- ☐ Ductwork sealed with mastic and insulated
- ☐ Garage[5] and attic are unconditioned spaces

Example 3



The top conditioned floor functions as a vaulted ceiling with interior walls althought it appears to have kneewalls and a flat ceiling. An advantage of this approach is that all upstairs ductwork is located inside the building envelope.

The crawlspace walls are insulated and do not contain vents. The crawlspace ground is covered with concrete or 100% plastic and functions as a "mini-basement."

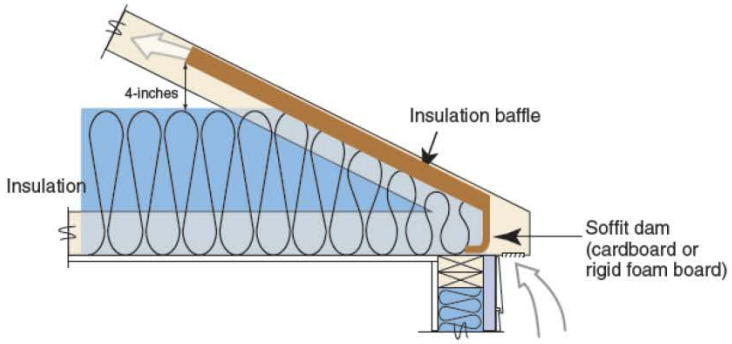
Example R-values[1]

- ☐ Vaulted ceiling[3]: R-19 air-impermeable foam insulation
- ☐ Exterior walls: R-13 + R-3 sheathing
- ☐ Crawlspace walls: R-5
- ☐ Ductwork sealed with mastic and insulated
- ☐ Garage[5] is unconditioned space

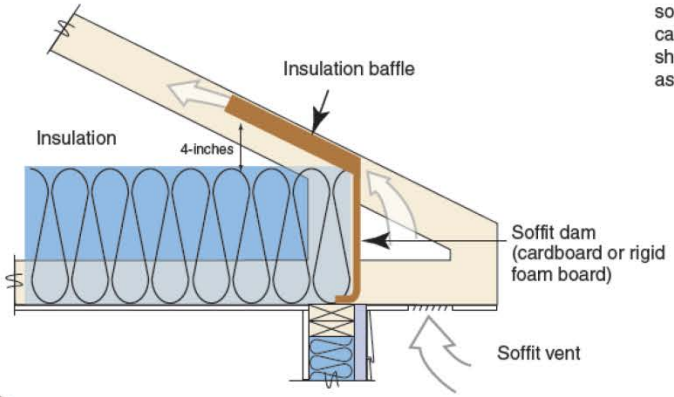
Insulation Details for Ceilings with Attic spaces

Rafter and Truss

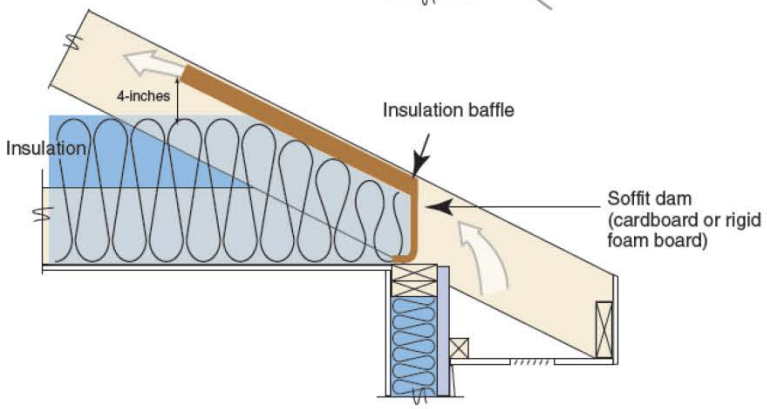
Standard Truss
with tapered
insulation depth



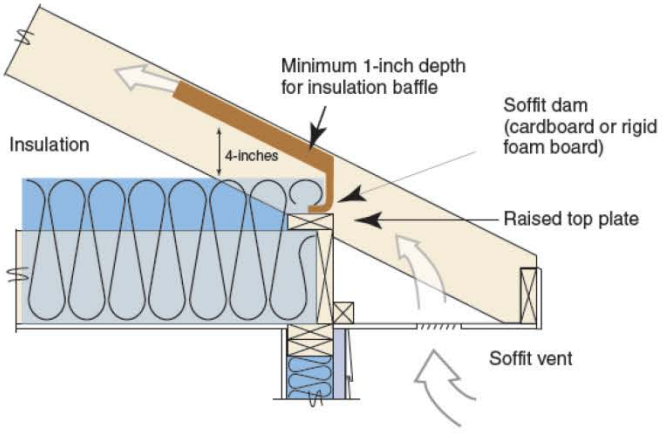
Energy Truss
with full height insulation
(recommended)



Standard rafter and top plate
with tapered
insulaton depth



Rafter on raised top plate
with full height insulation
(recommended)



Note: Wind wash baffle and air-permeable insulation dam. For air permeable insulation in vented attics, baffles shall be installed adjacent to soffit and eave vents. A minimum of a 1-inch of space shall be provided between the insulation and the roof sheathing and at the location of the vent. The baffle shall extend over the top of the insulation inward until it is at least 4 inches vertically above the top of the insulation. Any solid material such as cardboard or thin insulating sheathing shall be permissible as the baffle.

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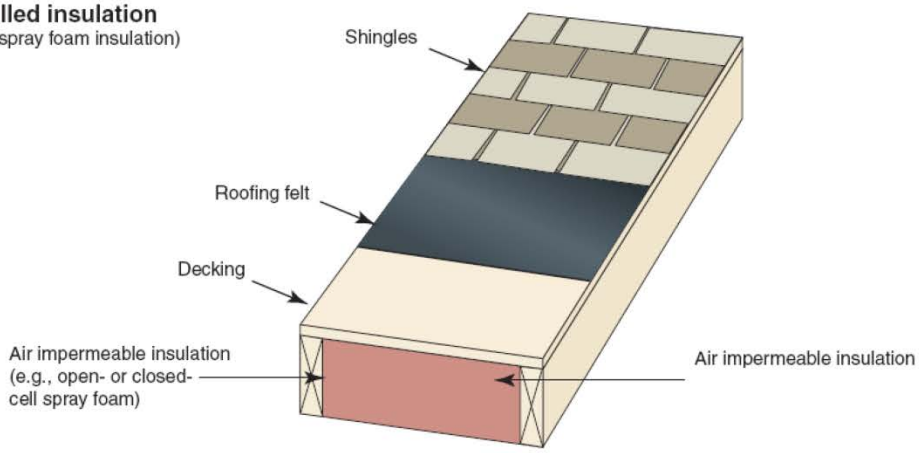
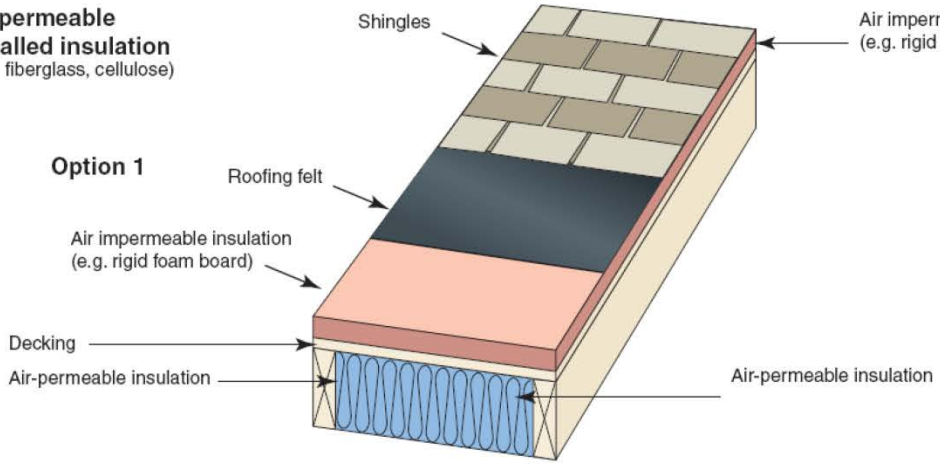
Roofline Installed Insulation Options

Air impermeable installed insulation
(e.g., spray foam insulation)

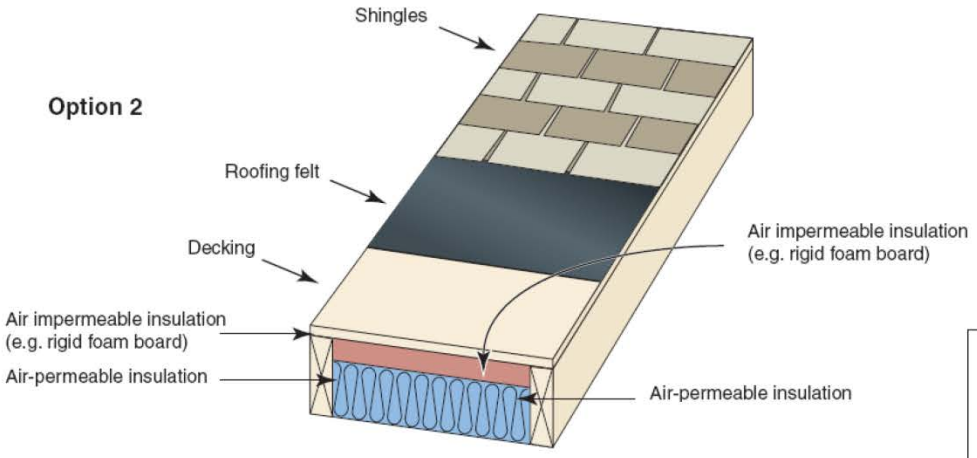


Air-permeable installed insulation
(e.g. fiberglass, cellulose)

Option 1



Option 2



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