2009 IRC + ALABAMA AMENDMENTS

RESIDENTIAL ENERGY CODE FIELD GUIDE

ADECA

2009 IRC + Alabama Amendments:

Residential Energy Code Field Guide

Alabama Department of Economic and Community Affairs

Energy Division

Montgomery, Alabama

First Edition – February 2012

For additional copies of this publication or other energy information, please contact:

Alabama Department of Economic and Community Affairs
401 Adams Avenue
P.O. Box 5690
Montgomery, AL 36103-5690
(334)242-5290
www.adeca.alabama.gov

Thus publication was prepared under contract to the Alabama Department of Economic and Community Affairs by Southface Energy Institute, Inc. Southface may be reached at:

Southface Energy Institute, Inc.
241 Pine Street, NE
Atlanta, GA 30309
(404)872-3549
www.southface.org

DISCLAIMER

This publication was prepared with the support of the U.S. Department of Energy (DOE) Grant No. DE-EE0000224. However, any opinions, findings, conclusions, or recommendations expressed herein are those of the authors and do not necessarily reflect the views of DOE.

Cover Design: Landon Reed Font Credit: jooki.de (http://www.dafont.com/imagine-font.font

Contents

Introduction 5
Instructions 6
Construction Documentation 8
Slab Edge Insulation 8
Basement Wall Exterior Insulation 9
Crawl Space Wall Insulation 9
Crawl Space Vapor Retarder 10
Snow Melt 10
Fenestration (e.g., windows and doors) U-Factor 11
Glazed Fenestration (e.g., windows and doors) and Skylight SHGC Values 12
Skylight U-Factor 12
Mass Wall Exterior Insulation 13
Duct Insulation 13
Duct Sealing 14
Duct Sealing (cont.) 15
No Building Cavities as Supply Ducts 16
IC-Rated Recessed Lighting Fixtures 17
HVAC Piping Insulation 17
Circulating Hot-Water Piping Insulation and Controls 18
Outdoor Intake/Exhaust Openings 18
Fenestration Air Leakage 19
Swinging Door Air Leakage 20
Floor Insulation 21
Wall Insulation 22
Basement Wall Interior Insulation 23
Basement Wall Interior Insulation (cont.) 24
Insulation R-values 24
Air-seal Tubs and showers 25
Air-seal Window/Door Openings 26
Air-seal Assemblies Separating Garage 28
Air-seal Bottom Plate and Top Plate 29
Air-seal Seams in Exterior Sheathing 31

Air-seal Utility Penetrations 32
Air-seal Dropped Ceilings and Chases 33
Air-seal Dropped Ceilings and Chases (cont.) 34
Air-seal Rim Joist Junctions 34
Ceiling Insulation 35
Attic Access 36
Attic Kneewall 37
Energy Code Compliance Certificate 38
Duct Tightness Testing 39
Envelope Tightness Verification 40
Lighting 41
Heat Pump Thermostat 41
Masonry Wood Burning Fireplaces 41
Heated Swimming Pools 42

Introduction

Alabama is adopting the 2009 International Residential Code (IRC) including the energy chapter (Chapter 11) as the state residential energy code. This code is expected to go into effect in the Spring of 2012. This field guide includes a detailed walkthrough of the requirements of the code and applicable state amendments. For links and other resources about the energy code including a video on using this residential field guide, visit: www.southface.org/energy-codes. For more information about the status of adoption and Alabama state amendments, visit: http://www.adeca.alabama.gov/C0/Codes/default.aspx

Importance of the Energy Code

Building energy codes are important for a number of reasons:

- **Building energy codes save consumers money.** A home that does not meet code standards results in wasted energy and high operating costs. Efficient buildings use less energy, putting that money back into a building owner's pocket.

- **Building energy codes result in healthier, more comfortable buildings.** Energy codes reduce the amount of outside air that enters the home, so that occupants breathe healthier air with appropriate levels of humidity. This keeps them comfortable year-round, resulting in high rates of satisfaction. In addition, because code-built homes are more comfortable, builders typically receive fewer callbacks, which increases the home's value.

- **Energy codes boost the local economy.** The money that consumers save on their homes' operating costs can be spent on other goods and services in the local economy. Similarly, workplaces can reinvest this money to support other areas of need.

- **Energy codes reduce our dependence on foreign energy.** Buildings consume 40 percent of the energy used in the United States. Because energy codes improve the efficiency of our building stock, they reduce the amount of energy that must be imported to meet domestic demand.

Overview of the 2009 IRC

Chapter 11 of the 2009 IRC ensures that all aspects of a building's thermal envelope (walls, windows, ceilings, floors and foundation separating conditioned space from unconditioned spaces) are both well-insulated and air-sealed effectively. To ensure air-sealing is executed appropriately with correct materials (fiberglass and cellulose insulation do not serve as air-barriers), the energy code requires that builders pass either a blower door test or a visual inspection to verify that the home is not "leaky."

The 2009 IRC also ensures that the HVAC system is sized properly, and that its ductwork is efficient and properly installed. For example, the energy code requires that builders seal their ductwork, and that the ductwork passes a leakage test.

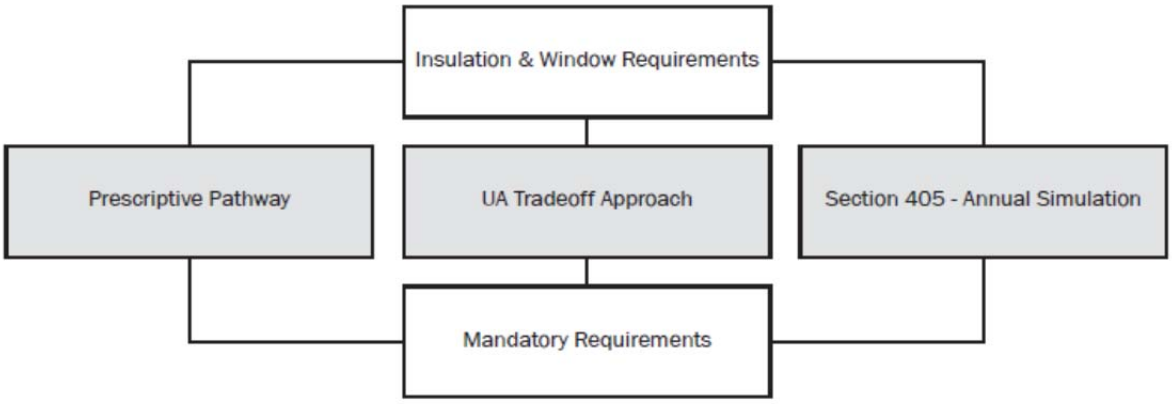
Finally, the energy code requires that a home's lighting is efficient. It requires that 50 percent of the light bulbs in permanent fixtures are efficient (e.g., CFL or fluorescent).

Instructions

The Residential Energy Code Field Guide is intended for use by code officials when inspecting residential construction projects for compliance with the energy chapter of the 2009 IRC. Based upon a modified version of the Department of Energy's Building Energy Code Program residential field compliance checklist[1], this field guide illustrates key requirements of the energy code. For every requirement, the code section number, the residential field compliance checklist item number, detailed instructions, graphical elements, and photo images to demonstrate code compliance in the field are given. Each element in the field guide is in the order in which you would inspect it in a home. It is important to note that some items may not apply in a particular home depending on home construction. For example, if a builder chooses to insulate the underfloor of a basement, basement wall insulation requirements do not apply.

Compliance Approach

Compliance with the insulation and window requirements in the energy code can be demonstrated by the prescriptive, trade-off (e.g., REScheck with 2009 IECC as chosen option)[2], or simulated performance approach[3]. In evaluating building compliance, the prescriptive approach should be assumed unless documentation is provided by the builder with either the trade-off or simulated performance approach. The *Code Value* column on the checklist contains the prescriptive requirement which must be met under the prescriptive approach. Whichever trade off approach is used mandatory requirements must be met.



If a trade-off or performance approach is used to demonstrate compliance, the building may NOT comply with the prescriptive code values listed in this field guide and yet may still be deemed to comply with the code (and therefore should be marked as compliant for the given checklist item) on the basis that some other aspect of the building exceeds the code requirement. For example, assume a trade-off approach was used and a valid REScheck software report was submitted showing a compliant building in Climate Zone 3 with R-19 ceiling insulation. In Climate Zone 3, the code's prescriptive insulation R-value requirement for a ceiling is listed as R-30. If the trade-off submission is valid, there will be some other building component

[1] Department of Energy. State Compliance Evaluation Checklists. Retrieved from: http://www.energycodes.gov/arra/compliance_checklists.stm
[2] REScheck does not allow one to choose 2009 IRC as a code. However, Alabama's amended code UA Tradeoff table is equivalent to the table in the 2009 IECC. Therefore, one can demonstrate compliance by choosing 2009 IECC in REScheck.
[3] The simulated performance approach is not an option in the 2009 IRC but is in the 2009 IECC. Because Alabama allows one to use the 2009 IECC to demonstrate compliance with the energy code, the performance approach is allowed.

that exceeds code requirements and offsets the non-compliant ceiling. There are minimum values you cannot "trade below" using the trade-off approach. If applicable, these minimum values are listed at the end of the description under each application.

Climate Zone

Many of the insulation and window requirements in the energy code depend on the climate zone of the home. This field guide lists the requirement by Climate Zone when applicable. The majority of Alabama is based in Climate Zone 3 while two counties on the coast of Alabama lie in Climate Zone 2. The bottom-half of Climate Zone 3 in Alabama or Climate Zone 3* indicates a location that is "warm-humid." The "warm-humid" Climate Zone 3 locations have separate basement wall insulation criteria. To look up your climate zone by county, see the table below:

Climate Zone 3			
Bibb	Cullman	Lauderdale	Shelby
Blount	DeKalb	Lawrence	St. Clair
Calhoun	Etowah	Lee	Sumter
Chambers	Fayette	Limestone	Talladega
Cherokee	Franklin	Madison	Tallapoosa
Chilton	Greene	Marion	Tuscaloosa
Clay	Hale	Marshall	Walker
Cleburne	Jackson	Morgan	Winston
Colbert	Jefferson	Pickens	
Coosa	Lamar	Randolph	
Climate Zone 3*			
Autauga	Conecuh	Geneva	Montgomery
Barbour	Covington	Henry	Perry
Bullock	Crenshaw	Houston	Pike
Butler	Dale	Lowndes	Russell
Choctaw	Dallas	Macon	Washington
Clarke	Elmore	Marengo	Wilcox
Coffee	Escambia	Monroe	
Climate Zone 2			
Baldwin	Mobile		

Construction Documentation

Code Section	R106.1
Checklist Item #	[PR1]
Description	A complete set of plans/construction drawings, specifications, and energy code compliance documentation must be submitted to the building department if a plan review is conducted. Construction documents should sufficiently demonstrate energy code compliance.

Slab Edge Insulation

Code Section	*N1102.1.1, N1101.7*
Checklist Item #	[FO1][FO2][FO3]
Code Value	**Unheated: R-0; Heated: R-5**
Description	Insulation for an unheated slab is not required. Heated slab insulation depth must be the depth of the footing or 2 feet, whichever is less.

Slab Edge Insulation Diagram*

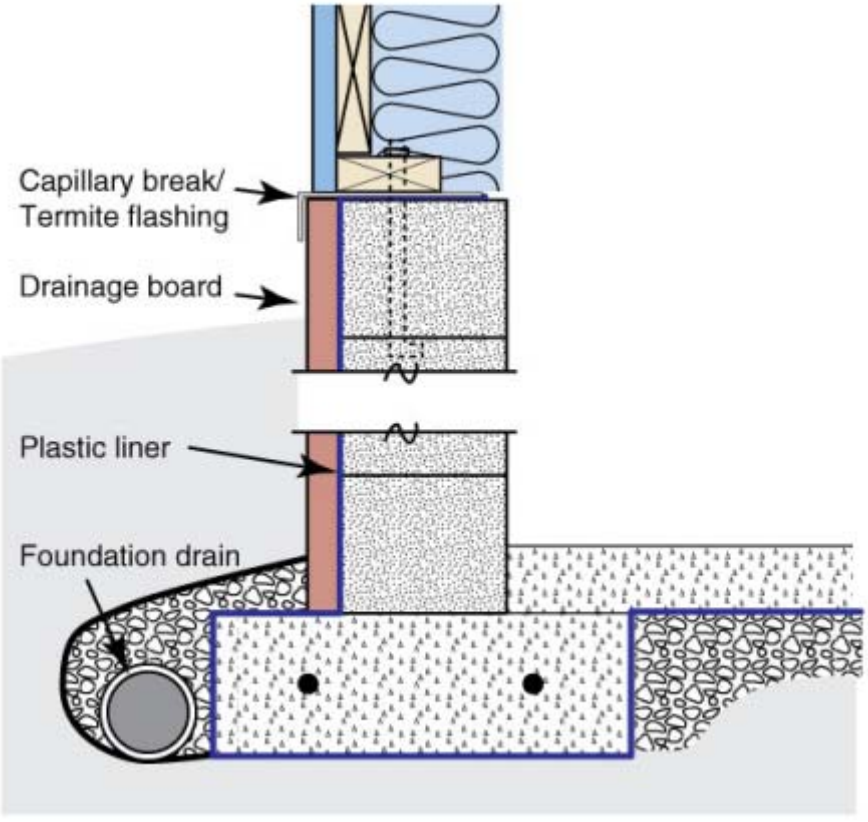


*Diagram also illustrates best practice moisture management techniques.

Basement Wall Exterior Insulation

Code Section	*N1102.1.1, N1101.7, N1102.2.7*
Checklist Item #	[FO4] [FO5] [FO6]
Code Value	**CZ2 & CZ3*:R-0** **CZ3:Continuous: R-5**
Description	Basement wall insulation is not required in Climate Zone 2 or warm-humid locations of Climate Zone 3. To find the appropriate Climate Zone, see the instructions. If insulation is installed on the exterior of the basement wall, code values listed above apply. Insulation may also be applied on the interior of the wall, on a basement wall or on the underfloor of the subfloor decking. If this is the case, see "Basement Wall Interior Insulation," "Wall Insulation" or "Floor Insulation" for the appropriate application. A basement wall is one that is at least 50% below grade. Insulation must be installed according to manufacturer's instructions. For the prescriptive approach, the insulation length (from the top of the basement wall to the basement floor) must be the lesser of 10 feet or to the top of the basement floor.

Crawl Space Wall Insulation

Code Section	*N1102.2.9, N1101.7*
Checklist Item #	[FO7] [FO8]
Code Value	**CZ2:R-0** **CZ3:Continuous: R-5; Cavity: R-13**
Description	Insulation must be installed according to manufacturer's instructions for crawl spaces that are not ventilated to the outside. Crawlspace wall insulation must be permanently fastened to the wall and extend downward from the floor to the finished grade and extend vertically and/or horizontally for at least an additional 24 inches. If the crawl space is ventilated, the floor above the crawl space must be insulated instead of insulating the crawl space walls.

Crawl Space Vapor Retarder

Code Section	*N1102.2.9*
Checklist Item #	[FO9]
Description	Where a crawl space is unvented (e.g. not open to the building exterior) the energy code requires that a Class I vapor retarder must be applied to the entire floor and run at least 6 in. up the walls of the crawl space and sealed to the walls. A Class I vapor retarder has a perm rating of less than 0.1 perm (such as polyethylene). Any seams in the vapor retarder must have an overlap of at least 6 in. and be sealed or taped.

Sealed and Overlapped Seams

Sealed and Applied 6 in. up Wall

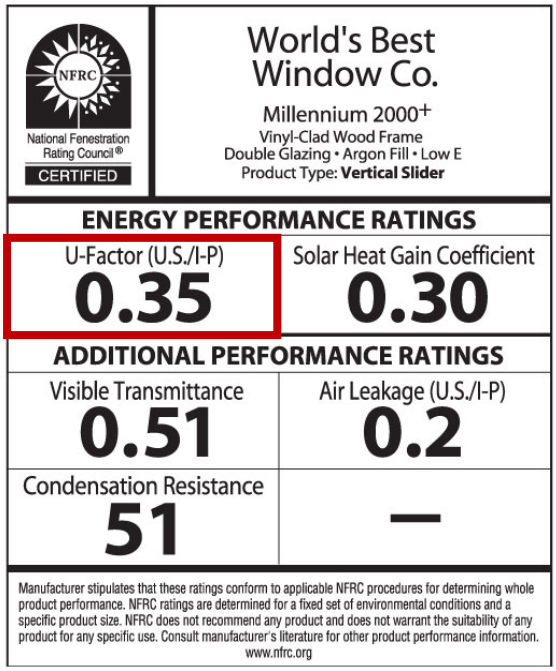
Snow Melt

Code Section	*N1103.8*
Checklist Item #	[FO11]
Description	If the building is provided with a snow or ice melting system (uncommon in the Southeast), the system must have controls to automatically shut the system off when the pavement temperature is above 50 ºF and precipitation is falling, and controls to automatically or manually shut the system off when the outdoor temperature is above 40 ºF.

Fenestration (e.g., windows and doors) U-Factor

Code Section	*N1102.1.1, N1102.3.1, N1102.3.3, N1102.3.4, N1102.5, N1101.5, N1102.3.5*
Checklist Item #	[FR1] [FR2] [FR4] [FR8]
Code Value	**CZ2:U-0.65; Impact Rated: U-0.75** **CZ3:U-0.50; Impact Rated: U-0.65**
Description	An area-weighted average can be used to satisfy the U-factor requirement. For the prescriptive approach only, up to 15 ft² of the total glazed fenestration, including skylights, do not have to meet the specified U-factor in the code. Glazing must be labeled and certified as meeting NFRC standards. If glazing is not NFRC certified, default values in Table N1101.5 must be used and these default values do not meet the prescriptive requirements in the energy code.[4] Under the prescriptive approach only, up to 24 ft² of side-hinged door do not have to meet the specified U-factor in the code.

NFRC Glazing Label (Highlighting U-Factor)

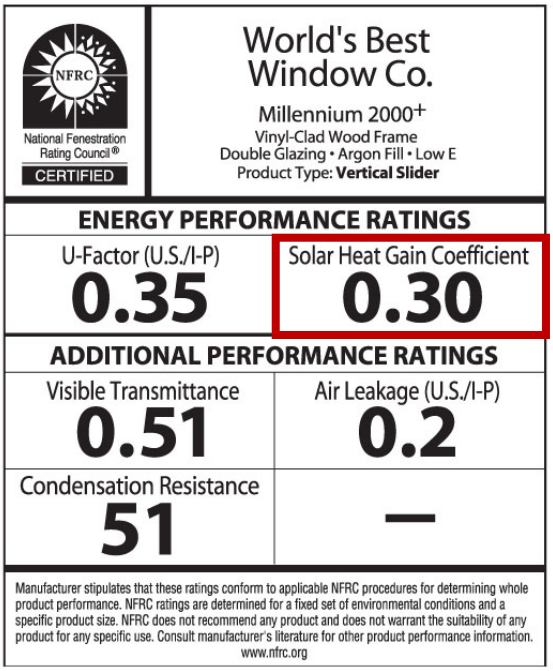


[4]If fenestration without an NFRC label is used, a builder can show compliance by demonstrating that an area-weighted average of all windows meet code. To meet the code in this way, the majority of installed fenestration must be "better than code." A builder could also demonstrate compliance by making trade-offs using REScheck or the simulated performance alternative.

Glazed Fenestration (e.g., windows and doors) and Skylight SHGC Values

Code Section	*N1102.1.1, N1102.3.2, N1102.3.3, N1101.5, N1102.3.5*
Checklist Item #	[FR3] [FR4] [FR7]
Code Value	**SHGC: 0.30**
Description	An area-weighted average can be used to satisfy the SHGC requirement. For the prescriptive approach only, up to 15 ft^2 of glazed fenestration do not have to meet the specified SHGC requirement. Glazing must be labeled and certified as meeting NFRC standards. If glazing is not NFRC certified, default values in Table N1101.5 must be used and these default values do not meet the prescriptive requirements in the energy code.4 Note: If REScheck is used, maximum SHGC is 0.50 for windows.

NFRC Glazing Label (Highlighting SHGC)



Skylight U-Factor

Code Section	*N1102.1.1, N1102.3.3, N1102.5, N1101.5*
Checklist Item #	[FR5] [FR7] [FR9]
Code Value	**CZ2:U-0.75** **CZ3:U-0.65**
Description	Glazing that is at least 15 degrees from vertical installed in the building envelope is subject to this requirement. For the prescriptive approach only, up to 15 ft^2 of the total glazed fenestration, including skylights, do not have to meet the specified U-factor in the code. Glazing must be labeled and certified as meeting NFRC standards. If glazing is not NFRC certified, default values in Table N1101.5 must be used and these default values do not meet the prescriptive requirements in the energy code.4

Mass Wall Exterior Insulation

Code Section	*N1102.1.1, N1101.7*
Checklist Item #	[FR10] [FR11]
Code Value	**CZ2:R-4** **CZ3:R-5**
Description	An above-grade mass wall is one that is less than 50% below grade. If the wall is at least 50% above grade, see "Basement Wall Exterior Insulation" requirements. Mass wall insulation must be installed in accordance with the manufacturer's installation instructions. If more than half the insulation is on the interior, the mass wall interior insulation requirement applies (see "Wall Insulation" requirements).

Duct Insulation

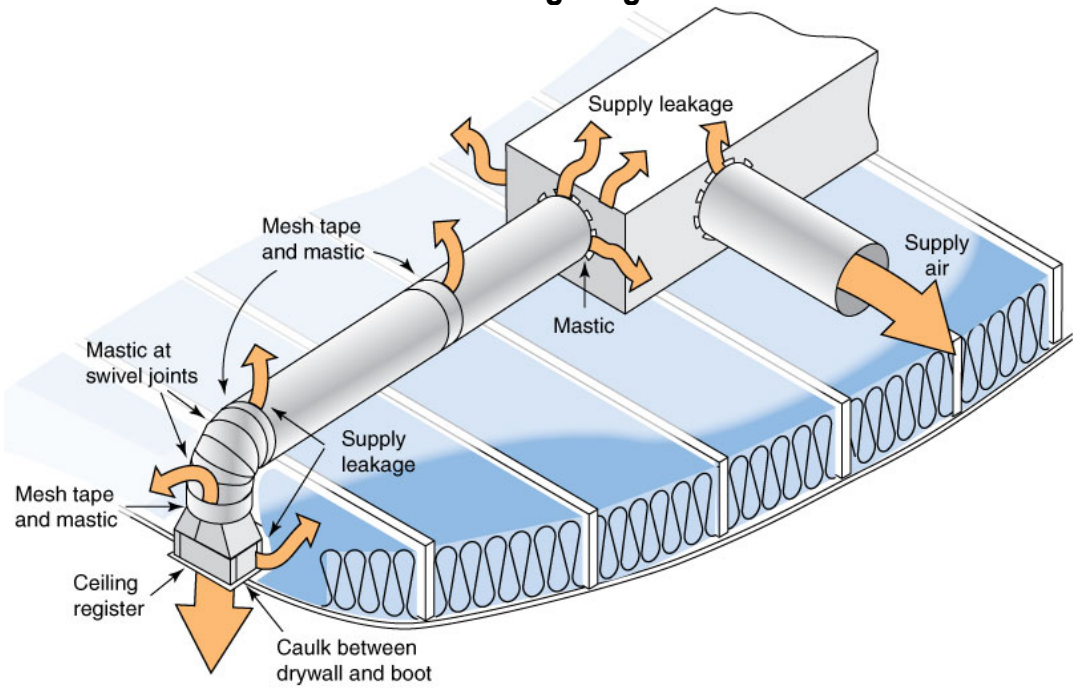
Code Section	*N1103.2.1*
Checklist Item #	[FR12]
Code Value	**Until July 1, 2013: R-6** **After July 1, 2013: Attic Supply: R-8; Other: R-6**
Description	R-value(s) of insulation apply to heating and/or cooling ducts that are not completely inside the building thermal envelope (e.g., are located outside the conditioned space). Until July 1, 2013, ductwork outside the building thermal envelope must be R-6. After July 1, 2013, attic supply ducts must be R-8. Other insulation requirements apply to all other ducts in unconditioned spaces like attic return ducts, or supply and return ducts located in unconditioned basements or crawlspaces.

R-8 Insulation of Attic Supply Duct

Duct Sealing

Code Section	*N1103.2.2*
Checklist Item #	[FR13]
Description	The joints and seams of all ducts, air handlers, filter boxes, and building cavities used as return air ducts must be sealed with UL-181 tape, mastic or mastic tape.

Duct Sealing Diagram



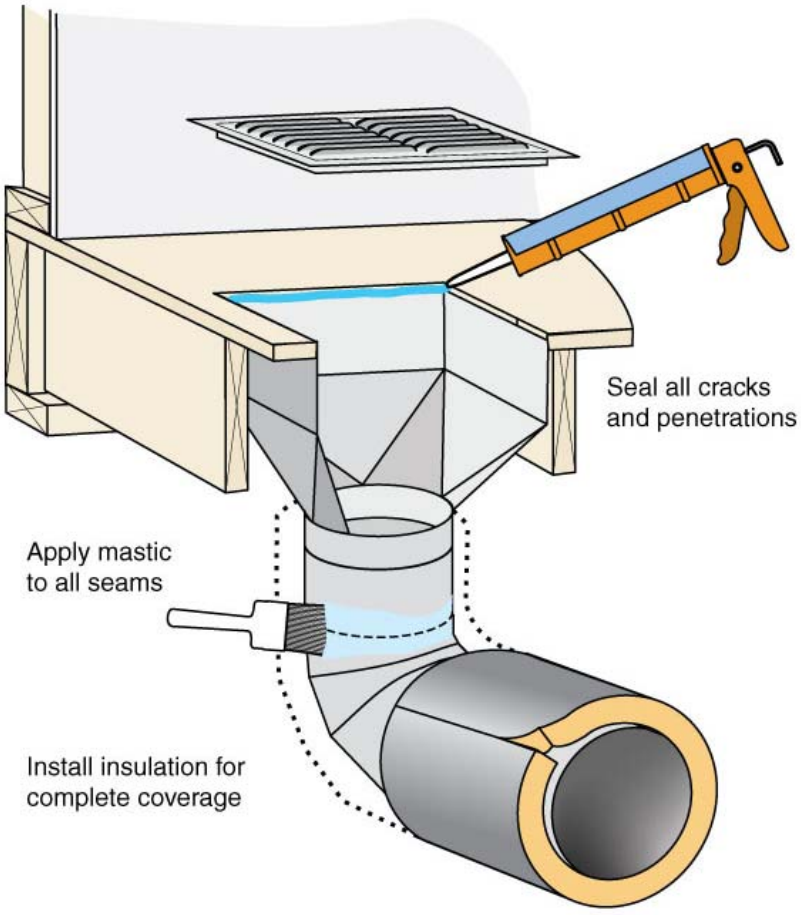
CORRECT: UL-181 Tape

Duct Sealing (cont.)

INCORRECT: No Sealant

CORRECT: Mastic-sealed Joints

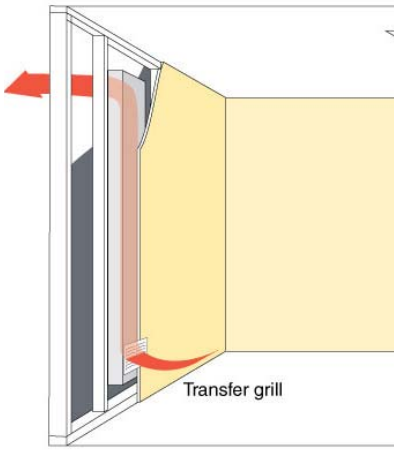
Duct Sealing Diagram



No Building Cavities as Supply Ducts

Code Section	*N1103.2.3*
Checklist Item #	[FR15]
Description	Building cavities may not be used as supply ducts (e.g., function to actually form the duct). All supply ducts must be lined with metal, flex duct, ductboard or other material approved in section M1601 of the IRC.

CORRECT: Metal-lined Cavity

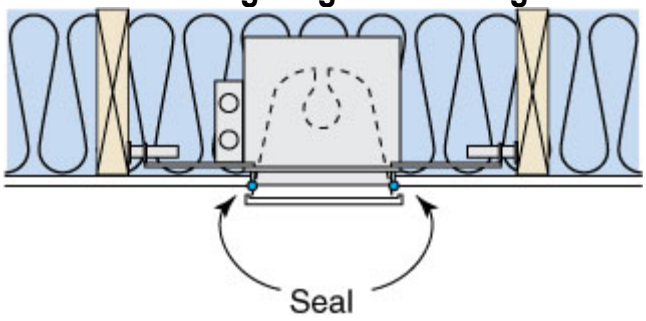


INCORRECT: Unlined Cavity as Supply

IC-Rated Recessed Lighting Fixtures

Code Section	*N1102.4.5*
Checklist Item #	[FR16]
Description	Recessed lighting fixtures must be air-tight and IC-rated in areas with insulation.and have a gasket or caulk applied between the fixture housing and the interior finish of the space.

Recessed Lighting Fixture Diagram



INCORRECT: Standard Fixture

CORRECT: IC-Rated and Air-Tight

HVAC Piping Insulation

Code Section	*N1103.3*
Checklist Item #	[FR17]
Code Value	**R-3**
Description	HVAC system piping capable of carrying fluides above 105°F or below 55°F must be insulated.

Circulating Hot-Water Piping Insulation and Controls

Code Section	*N1103.4*
Checklist Item #	[FR18] [FI11]
Code Value	**R-2**
Description	Circulating hot water piping must be insulated. All pumps must also have either automatic controls or a manual control that is readily accessible to turn off the system when not in use.

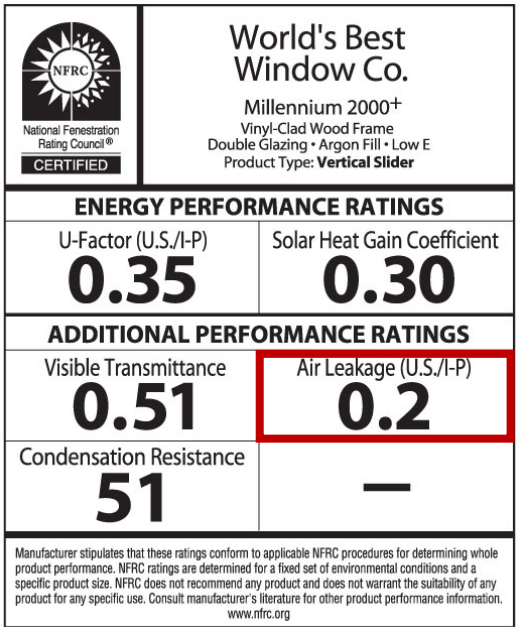
Outdoor Intake/Exhaust Openings

Code Section	*N1103.5*
Checklist Item #	[FR19]
Description	All outdoor intake and exhaust openings must have either gravity (self-closing) or automatic dampers that will close when the system associated with the air intake or exhaust is not functioning. To ensure that dampers close correctly, direction of airflow must be taken into account when installed.

Fenestration Air Leakage

Code Section	*N1102.4.4*
Checklist Item #	[FR20] [FR22]
Code Value	**0.3 cfm/ft²**
Description	Each window, skylight, and sliding glass door must be tested to the referenced NFRC 400 or AAMA/WDMA/CSA standards and meet the required air infiltration rate. If the tested rate is not shown on the assembly, one could determine the make and model number and consult the manufacturer's web site or other source of data to determine the air leakage of the assembly as tested by an independent laboratory. Each window, skylight and sliding glass door must also have a label, seal, symbol or other identifying mark indicating the test results or compliance with the code. Site-built windows, skylights, and sliding glass doors are not required to meet this requirement.

NFRC Glazing Label (Highlighting SHGC)



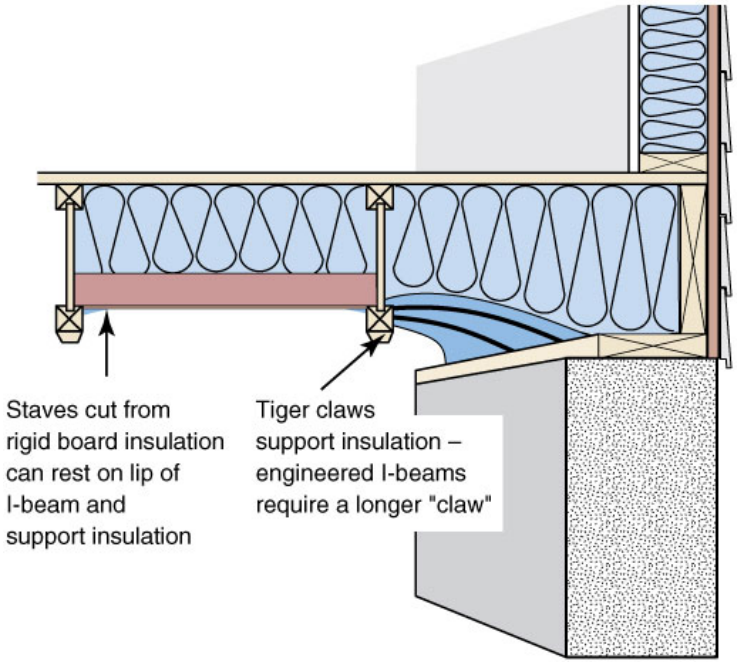
Swinging Door Air Leakage

Code Section	*N1102.4.4*
Checklist Item #	[FR21] [FR22]
Code Value	**0.5 cfm/ft^2**
Description	Each swinging door must be tested to the referenced NFRC 400 or AAMA/WDMA/CSA standards and meet the required air infiltration rate. If the tested rate is not shown on the assembly, one could determine the make and model number and consult the manufacturer's web site or other source of data to determine the air leakage of the assembly as tested by an independent laboratory. Each swinging door must also have a label, seal, symbol, or other identifying mark indicating the test results or compliance with the code. Site built swinging doors are not required to meet this requirement.

Floor Insulation

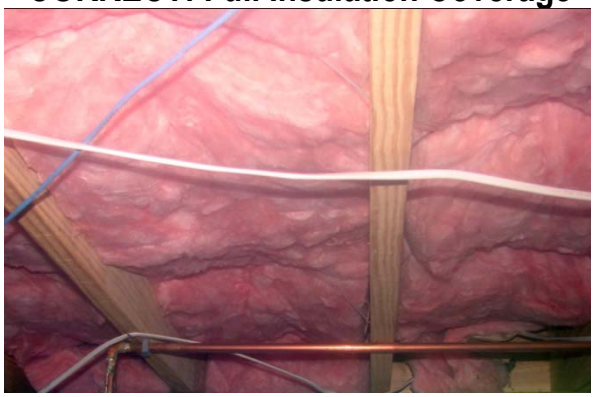
Code Section	*N1102.1.1, N1102.2.5, N1102.2.6, N1101.7*
Checklist Item #	[IN1] [IN2]
Code Value	**CZ2: Wood: R-13;** **Steel[5]: R-19 in 2x6; R-19+R-6 in 2x8 or 2x10** **CZ3: Wood: R-19;** **Steel5: R-19+R-6 in 2x6; R-19+R-12 in 2x8 or 2x10**
Description	Floor insulation must be installed on any wood-framed, steel-framed, or raised concrete floor associated with the building thermal envelope. Floor insulation must be installed in accordance with the manufacturer's installation instructions and in permanent contact with the underside of the subfloor decking.

Proper Floor Insulation Diagram



INCORRECT:Poor Insulation Coverage

CORRECT: Full Insulation Coverage



[5] Cavity insulation R-value is listed first, followed by continuous insulation R-value.

Wall Insulation

Code Section	*N1102.1.1, N1102.2.4, N1102.2.5, N1101.7, N1102.2.11*
Checklist Item #	[IN3] [IN4] [IN8] [IN9]
Code Value	**CZ2: Wood: R-13** **Mass: Interior: R-6; Exterior or Integral: R-4** **Steel[6]: R-13+R-5; R-15+R-4; R-21+R-3; R-0+R-10** **CZ3: Wood: R-13** **Mass: Interior: R-8; Exterior or Integral: R-5** **Steel[4]: R-13+R-5; R-15+R-4; R-21+R-3; R-0+R-10**
Description	Insulation must be applied to wood-framed, steel-framed, and mass walls that are above grade and associated with the building thermal envelope. An above-grade wall is one that is more than 50% above grade. Mass walls are those of concrete block, concrete, ICFs, masonry cavity, brick (non-veneer), earth/adobe, and solid timber/logs. Wall insulation must be installed in accordance with the manufacturer's installation instructions and all places in the wall that will accommodate insulation must be insulated. Insulation in sunroom walls (rooms thermally isolated from conditioned space) must meet this criteria.

CORRECT: Batt in Wood-framed Cavity

INCORRECT: Unfilled Cavity

CORRECT: Full Coverage and No Compression

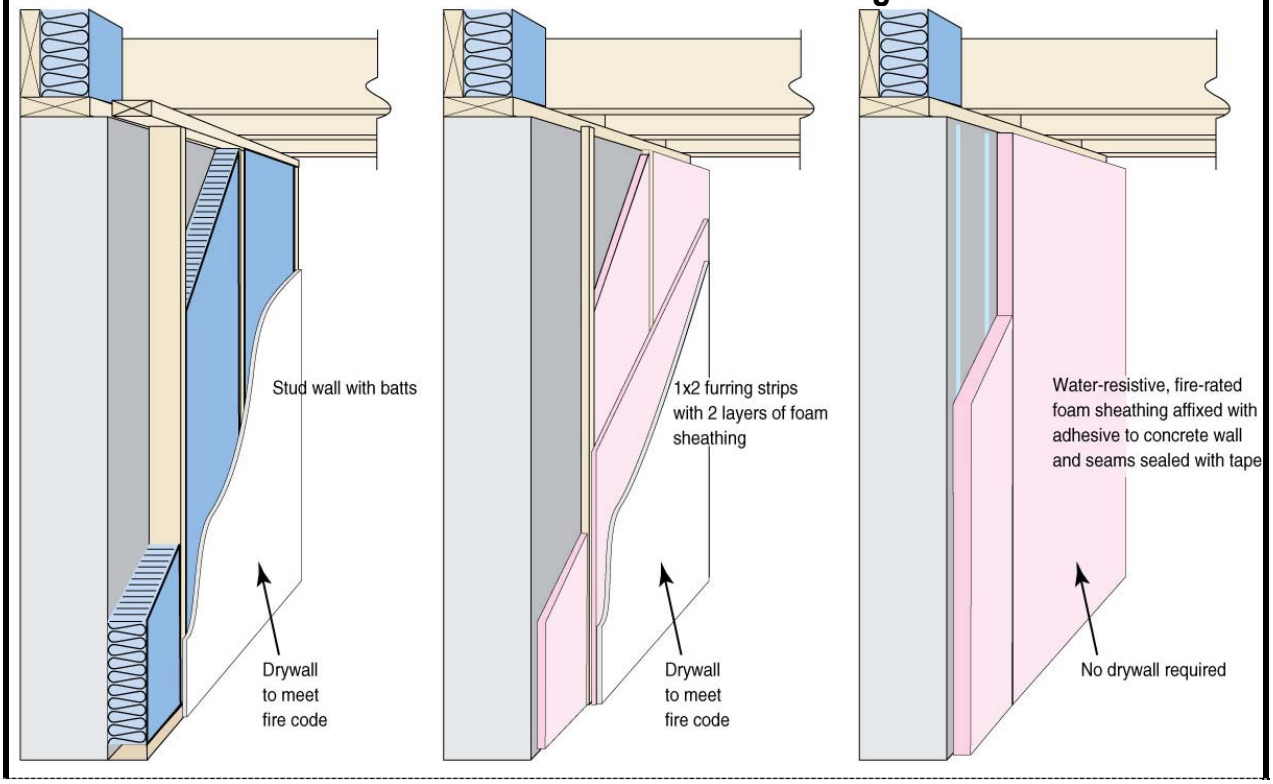
INCORRECT: Compression and Poor Coverage

[6] Cavity insulation R-value is listed first, followed by continuous insulation R-value.

Basement Wall Interior Insulation

Code Section	*N1102.1.1, N1102.2.7*
Checklist Item #	[IN5] [IN6] [IN7]
Code Value	**CZ2 & CZ3*:R-0** **CZ3:Continuous: R-5; Cavity: R-13**
Description	Basement wall insulation is not required in Climate Zone 2 or warm-humid locations of Climate Zone 3. To find the appropriate Climate Zone, see the instructions. A basement wall is one that is at least 50% below grade. If the floor above the basement and other components separating the basement from the rest of the building are not insulated, insulation must be applied to the interior or exterior walls. For exterior wall insulation requirements, see "Basement Wall Exterior Insulation." Basement wall insulation must extend to the basement floor or to 10 ft, whichever is less. Basement wall insulation must be installed in accordance with the manufacturer's installation instructions and all places in the wall that will accommodate insulation must be insulated.

Basement Wall Interior Insulation Diagram



Basement Wall Interior Insulation (cont.)

Insulation Installed in Full Contact with Wall

INCORRECT (CZ3): Insulation not on Concrete Portion of Basement Wall

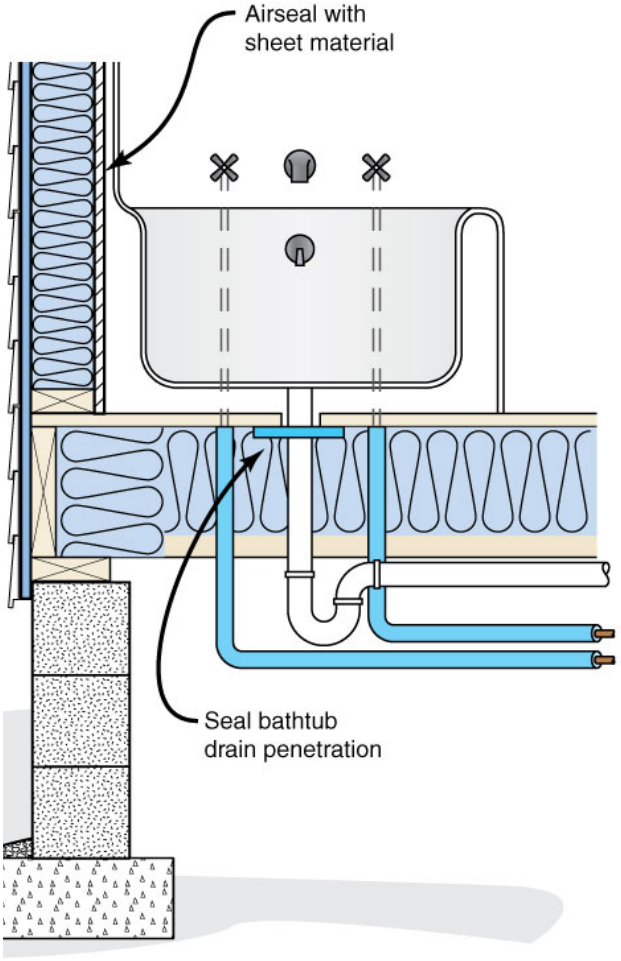
Insulation R-values

Code Section	*N1101.4.2*
Checklist Item #	[IN13]
Description	All insulation installed in the building thermal envelope must have a label on the insulation indicating the R-value of the insulation or a certificate verifying the type of insulation, the installed thickness and installed R-value. In addition, a certificate for blown in insulation must provide the installed density, coverage and number of bags of insulation.

Air-seal and Insulate Tubs and Showers

Code Section	*N1102.4.1, N1102.4.2*
Checklist Item #	[IN14] [IN15] [IN16]
Description	Insulation and a sealed air barrier must be installed behind all tubs and showers located on exterior walls. In addition, all plumbing penetrations must be appropriately air-sealed.

Tub Air-sealing and Insulation Diagram



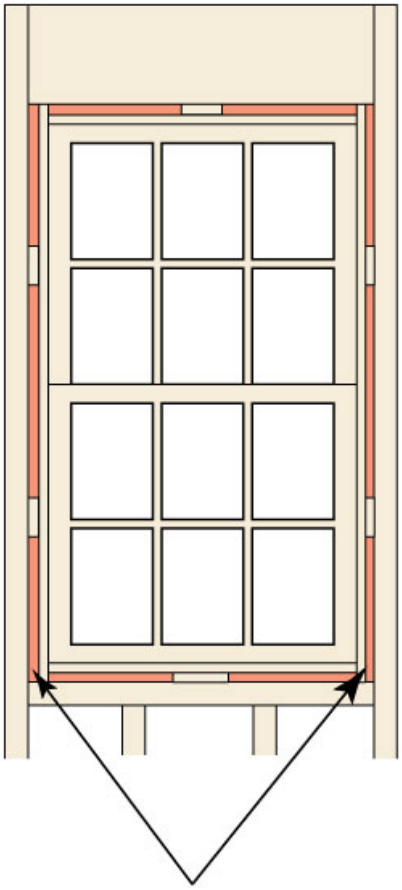
CORRECT: Air Barrier Behind Tub

INCORRECT: Drain Penetration Open

Air-seal Window/Door Openings

Code Section	*N1102.4.1, N1102.4.2*
Checklist Item #	[IN14] [IN15] [IN16]
Description	Gaps between window and door and rough opening must be air-sealed (e.g., with low expanding foam or backer rod).

Window Air-sealing Diagram



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

Air Sealing with Backer Rod

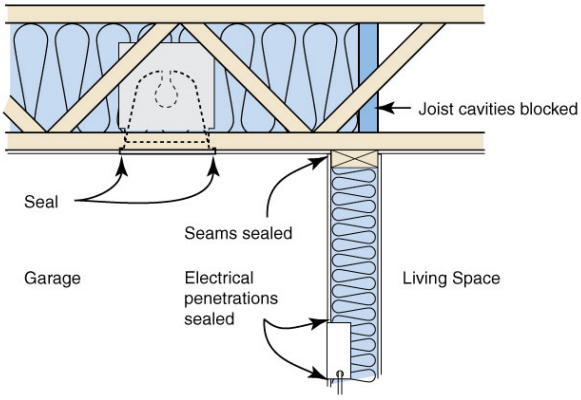
Air Sealing with Spray Foam

Air-seal Assemblies Separating Garage

Code Section	*N1102.4.1, N1102.4.2*
Checklist Item #	[IN14] [IN15] [IN16]
Description	Walls and ceilings seperating garage from conditioned space must be air-sealed. For example, all floor joists above attached garages must be blocked and sealed.

INCORRECT: Air Bypass Behind Stairs

Air-sealing Assembly for Garage

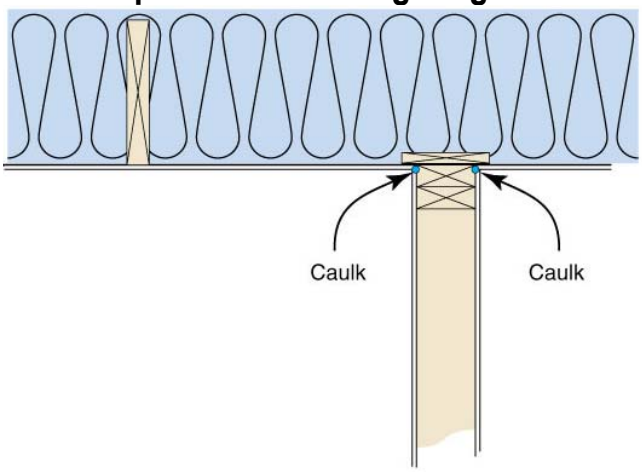


CORRECT: Joist Cavities Blocked

Air-seal Bottom Plate and Top Plate

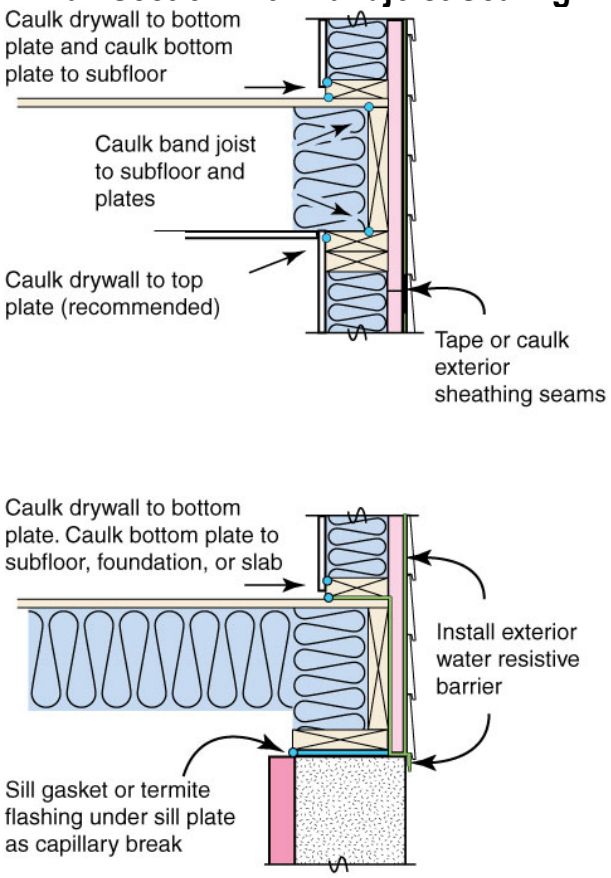
Code Section	*N1102.4.1, N1102.4.2*
Checklist Item #	[IN14] [IN15] [IN16]
Description	All joints, seams, and penetrations must be sealed. For example, bottom plates of walls separating conditioned and unconditioned spaces must be sealed to subfloor or foundation.Top plate must also be sealed to drywall at all interfaces between unconditioned attic and wall. Sealant may be applied from attic side to joints between drywall and top plate.

Top Plate Air-sealing Diagram



Caulking Around Bottom Plate

Wall Section with Bandjoist Sealing



Air-seal Seams in Exterior Sheathing

Code Section	*N1102.4.1, N1102.4.2*
Checklist Item #	[IN14] [IN15] [IN16]
Description	All joints, seams and penetrations must be sealed. For example, gaps in exterior sheathing must be sealed using appropriate sealant.

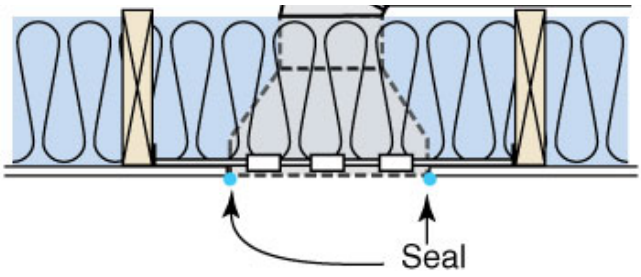
INCORRECT: Gaps in Sheathing

CORRECT: Sealing Exterior Sheathing

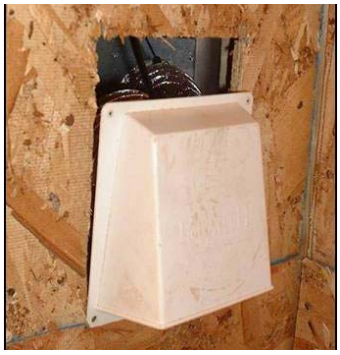
Air-seal Utility Penetrations

Code Section	*N1102.4.1, N1102.4.2*
Checklist Item #	[IN14] [IN15] [IN16]
Description	All utility penetrations through areas seperating conditioned space from unconditioned spaces must be air sealed. For example, penetrations from plumbing, wiring, ductwork, exhaust fans, light fixtures, and electrical boxes through top and bottom plates, exterior sheathing, band and rim joists, insulated walls, insulated ceilings, and insulated subfloors must be sealed.

Ductboot Penetration Sealing

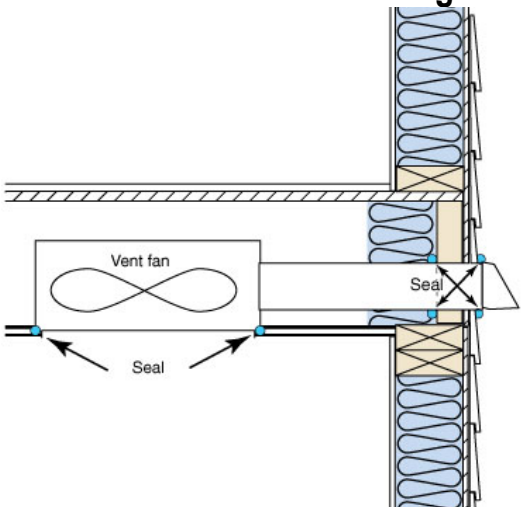


INCORRECT: Unsealed Sheathing Penetration



CORRECT: Air-sealed Utility Penetrations

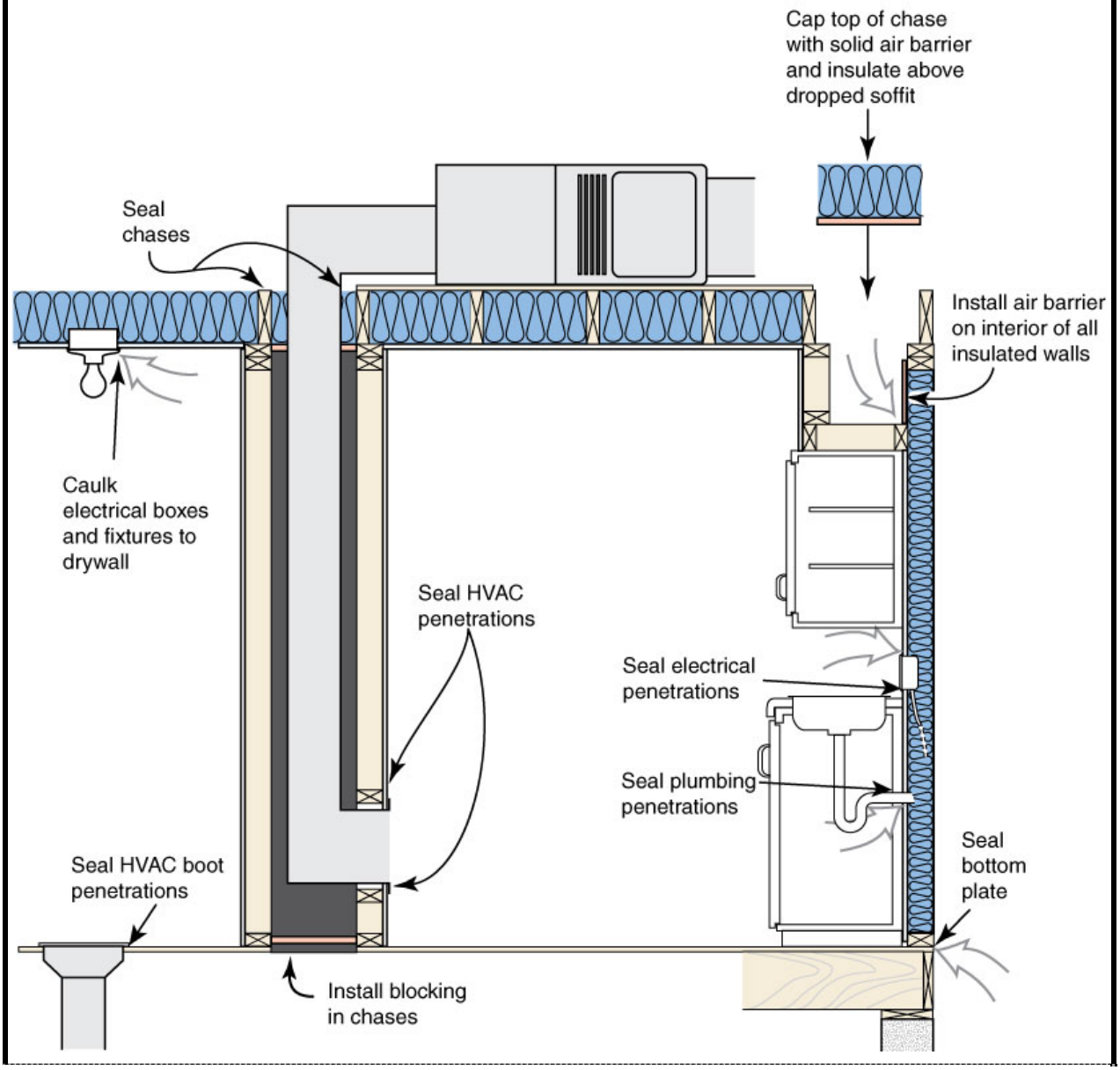
Band Penetration Sealing



Air-seal Dropped Ceilings and Chases

Code Section	*N1102.4.1, N1102.4.2*
Checklist Item #	[IN14] [IN15] [IN16]
Description	Framed spaces that connect conditioned areas to unconditioned areas above and below the chase (including attics, unconditioned basements, or vented crawl spaces) must be air-sealed (e.g., using sheet material and appropriate sealant). These areas include chases for plumbing, duct work, chimneys, and flues. Dropped ceilings/soffits between conditioned areas and the attic must also be air-sealed.

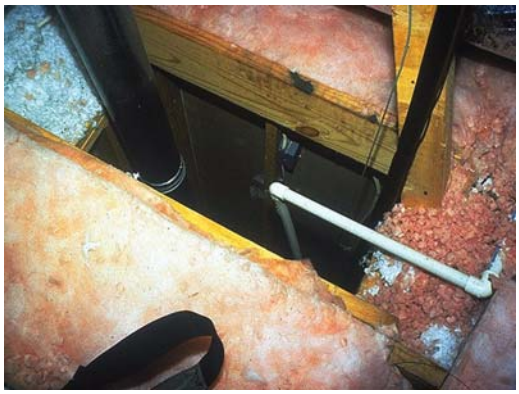
Proper Air-sealing for Chases



Air-seal Dropped Ceilings and Chases (cont.)

INCORRECT: Improperly Capped Chase

INCORRECT: Unsealed Chase



CORRECT: Well-capped Chase

CORRECT: Well-sealed Chase (Prior to Duct Installation)

Air-seal Rim Joist Junctions

Code Section	*N1102.4.1, N1102.4.2*
Checklist Item #	[IN14] [IN15] [IN16] [FI2]
Description	All penetrations (e.g., from holes drilled for HVAC lines, plumbing lines, bathroom fans, exhaust fans, and electrical lines) through the band/rim joist located between conditioned and unconditioned spaces must be sealed.

Ceiling Insulation

Code Section	*N1102.1.1, N1102.2.1, N1102.2.2, N1102.2.11, N1101.4.1, N1101.7*
Checklist Item #	[FI1] [IN10] [IN11]
Code Value	**Wood: R-30** **Steel truss equivalent[7]: R-38, R-30+R-3, R-26+R-5** **Steel joist equivalent7: R-38 in 2x4, 2x6, or 2x8**
Description	For blown-in attic insulation, rulers must be provided for every 300 ft^2 of attic space. Insulation in sunroom ceilings (rooms thermally isolated from conditioned space) must meet this criteria. All insulation must be installed in accordance with the manufacturer's installation instructions.

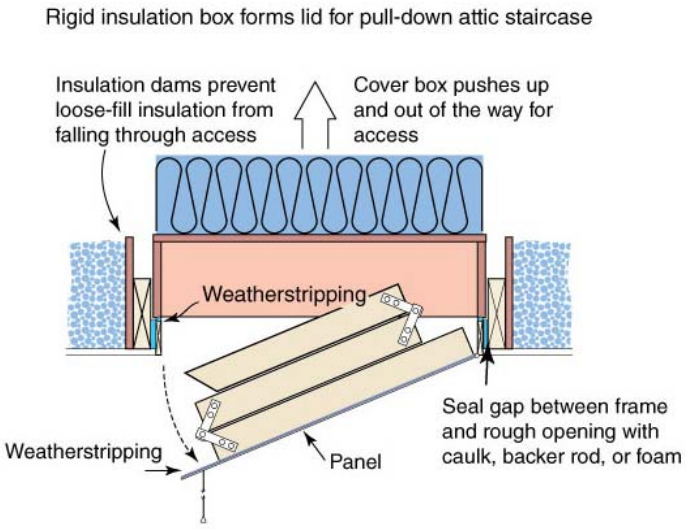
Ceiling Insulation Ruler

[7] Cavity insulation R-value is listed first, followed by continuous insulation R-value.

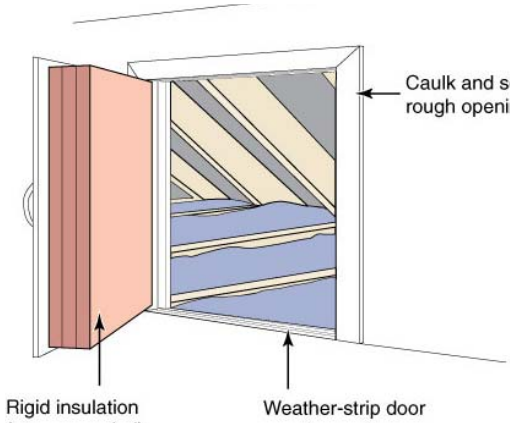
Attic Access

Code Section	*N1102.2.3, N1102.4.1, N1102.4.2*
Checklist Item #	[IN14] [IN15] [IN16] [FI3]
Code Value	**Attic Hatch/Pull-Down Stairs: R-30; Vertical doors: R-13**
Description	The attic access must be insulated and air-sealed (weather stripped). A wood framed or equivalent baffle or retainer is required where loose fill insulation is installed.

Attic Pull-Down Stairs

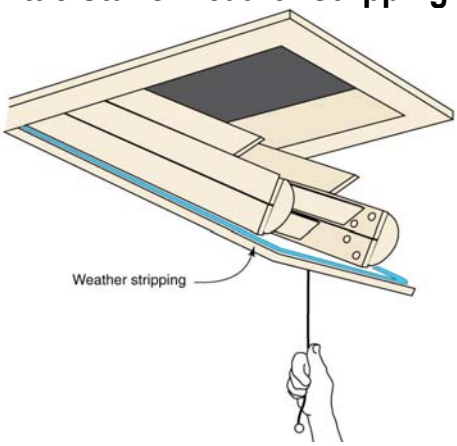


Attic Kneewall Door



Attic Access Hatch with Batt Insulation

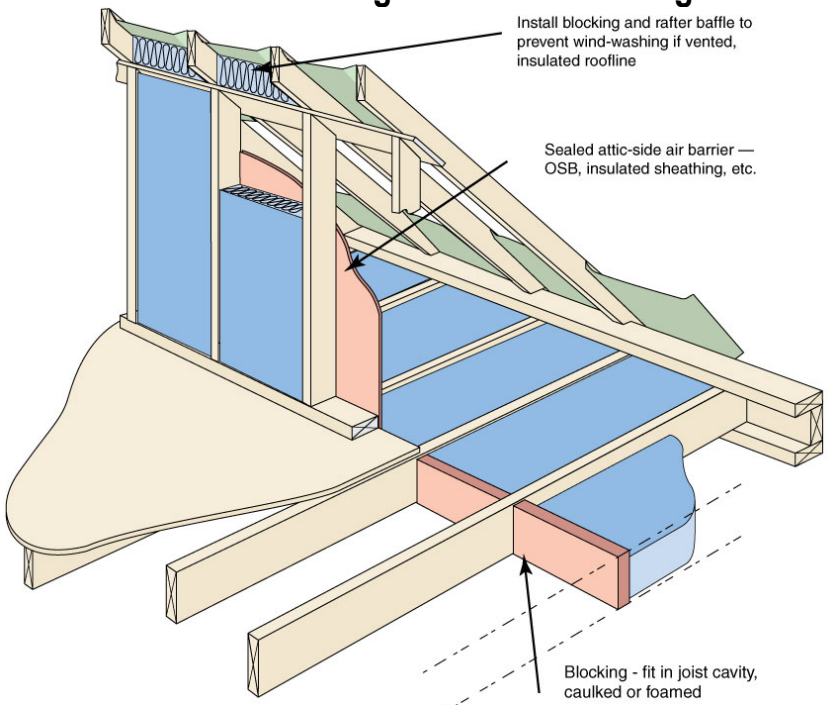
Attic Stairs Weather Stripping



Attic Kneewall

Code Section	*N1102.1.1*
Checklist Item #	N/A
Code Value	**R-13**
Description	An attic kneewall is defined as any vertical or near vertical wall in the building envelope that has conditioned space on one side and attic space on the other side. All attic kneewalls must be insulated and air-sealed. For example, the top and bottom of the kneewall stud cavity must be blocked and sealed to encapsulate insulation.

Kneewall Air-sealing and Insulation Diagram



CORRECT: Blocked Joist Cavity/Sealed Attic-side Air Barrier

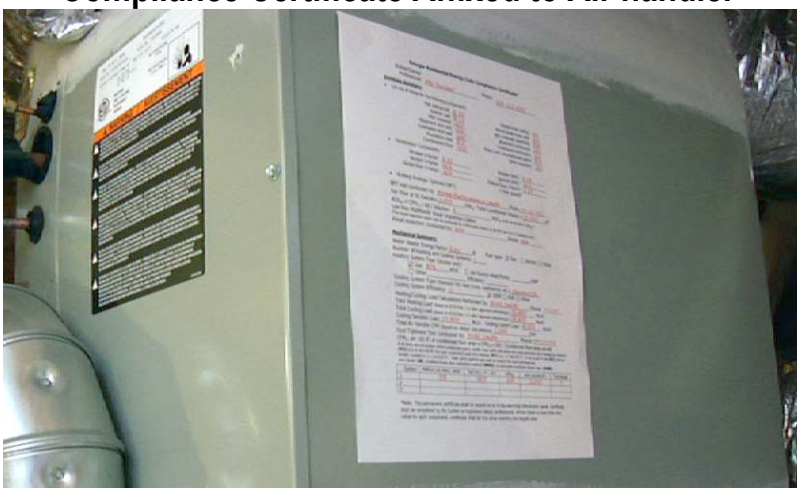
INCORRECT: Unblocked Joist Cavity

Inspector reaching through the unblocked joist cavity revealing a significant pathway for unconditioned attic air into the building envelope.

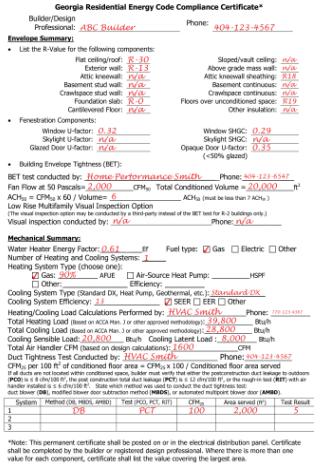
Energy Code Compliance Certificate

Code Section	*N1101.3*
Checklist Item #	[FI7]
Description	A certificate identifying the energy-related features of the building can be located on or near the electrical distribution panel or air handler. The certificate should include predominate R-values of insulation, U-factors and SHGC for fenestration, and the types and efficiencies of heating, cooling and water heating equipment. This requirement is optional in Alabama.

Compliance Certificate Affixed to Air handler



Sample Certificate



Georgia Residential Energy Code Compliance Certificate*

Builder/Design Professional: *ABC Builder* Phone: *404-123-4567*

Envelope Summary:

- List the R-Value for the following components:

Flat ceiling/roof:	R-30	Sloped/vault ceiling:	n/a
Exterior wall:	R-13	Above grade mass wall:	n/a
Attic kneewall:	n/a	Attic kneewall sheathing:	R10
Basement stud wall:	n/a	Basement continuous:	n/a
Crawlspace stud wall:	n/a	Crawlspace continuous:	n/a
Foundation slab:	R-0	Floors over unconditioned space:	R19
Cantilevered Floor:	n/a	Other insulation:	n/a

- Fenestration Components:

Window U-factor:	0.32	Window SHGC:	0.29
Skylight U-factor:	n/a	Skylight SHGC:	n/a
Glazed Door U-factor:	n/a	Opaque Door U-factor: (<30% glazed)	0.35

- Building Envelope Tightness (BET):

BET test conducted by: *Home Performance Smith* Phone: *404-123-4567*

Fan Flow at 50 Pascals= *2,000* CFM_{50} Total Conditioned Volume = *20,000* ft^3

ACH_{50} = CFM_{50} x 60 / Volume= *5* ACH_{50} (must be less than 7 ACH_{50})

Low Rise Multifamily Visual Inspection Option

(The visual inspection option may be conducted by a third-party instead of the BET test for R-2 buildings only.)

Visual inspection conducted by: *n/a* Phone: *n/a*

Mechanical Summary:

Water Heater Energy Factor: *0.61* Yr Fuel type: ☑ Gas ☐ Electric ☐ Other

Number of Heating and Cooling Systems: *1*

Heating System Type (choose one):

☑ Gas: *90%* AFUE ☐ Air-Source Heat Pump: _____HSPF

☐ Other:_____ Efficiency:_____

Cooling System Type (Standard DX, Heat Pump, Geothermal, etc.): *Standard DX*

Cooling System Efficiency: *13* ☑ SEER ☐ EER ☐ Other

Heating/Cooling Load Calculations Performed by: *HVAC Smith* Phone: *770-123-4567*

Total Heating Load (Based on ACCA Man. J or other approved methodology): *19,800* Btu/h

Total Cooling Load (Based on ACCA Man. J or other approved methodology): *28,800* Btu/h

Cooling Sensible Load: *20,800* Btu/h Cooling Latent Load : *8,000* Btu/h

Total Air Handler CFM (based on design calculations): *1600* CFM

Duct Tightness Test Conducted by: *HVAC Smith* Phone: *404-123-4567*

CFM_{25} per 100 ft^2 of conditioned floor area = CFM_{25} x 100 / Conditioned floor area served

If all ducts are not located within conditioned space, builder must verify that either the postconstruction duct leakage to outdoors (**POD**) is ≤ 8 cfm/100 ft², the post construction total duct leakage (**PCT**) is ≤ 12 cfm/100 ft², or the rough-in test (**RIT**) with air handler installed is ≤ 6 cfm/100 ft². State which method was used to conduct the duct tightness test: duct blower (**DB**), modified blower door subtraction method (**MBDS**), or automated multipoint blower door (**AMBD**).

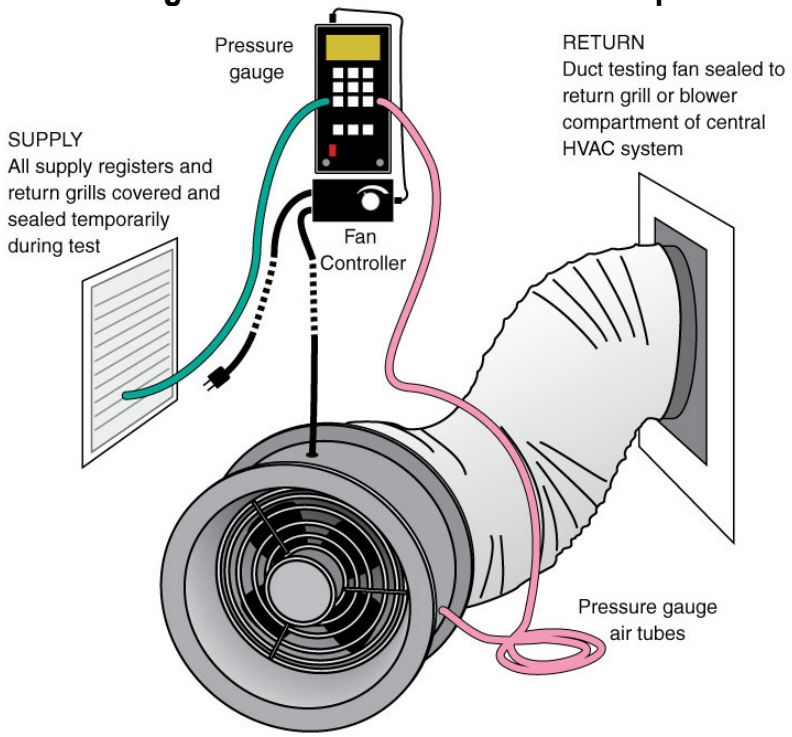
System	Method (DB, MBDS, AMBD)	Test (POD, PCT, RIT)	CFM_{25}	Area served (ft^2)	Test Result
1	DB	PCT	100	2,000	5
2					
3					

*Note: This permanent certificate shall be posted on or in the electrical distribution panel. Certificate shall be completed by the builder or registered design professional. Where there is more than one value for each component, certificate shall list the value covering the largest area.

Duct Tightness Testing

Code Section	*M1601.4.1.1*
Checklist Item #	[FR14] [FI4]
Code Value	**Rough-in total leakage w/o air handler: ≤ 4%;** **Rough-in total leakage w/ air handler: ≤ 6%;** **Post-construction leakage to outdoors: ≤ 8%;** **Post-construction total leakage: ≤ 12%**
Description	Effective July 1, 2013, the ducts and air handler, if not completely located inside the conditioned spaces, must be tested for tightness. Testing can either occur at rough-in or at post-construction. Any one of the above requirements must be met.

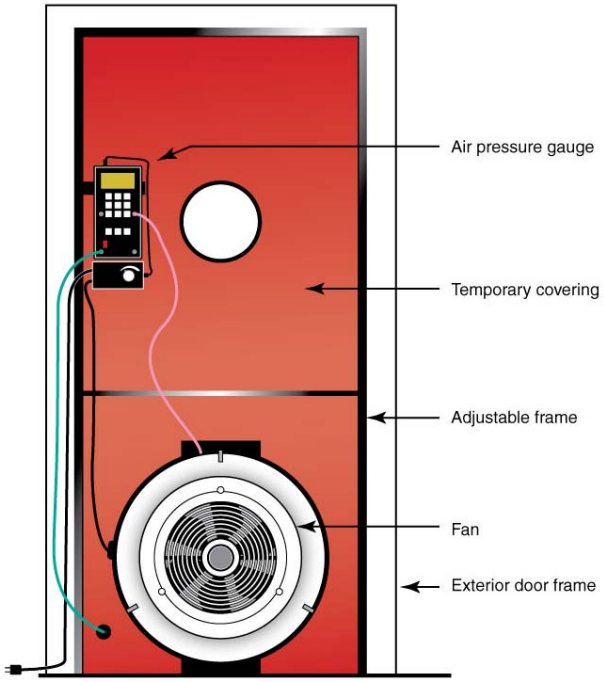
Diagram of Duct Pressure Test Setup



Envelope Tightness Verification

Code Section	*N1102.4.2, N1102.4.2.1*
Checklist Item #	[IN12]
Code Value	**$ACH_{50} < 7$**
Description	Buildings must either be tested for tightness with a blower door and meet the requirement listed above or undergo a rigorous visual inspection of proper air-sealing and insulation as detailed in Table N1102.4.2 of the 2009 IRC.

Diagram of Blower Door Setup



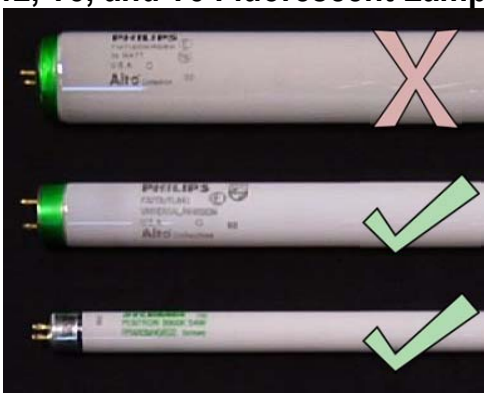
Blower Door Setup in Door Frame

Lighting

Code Section	*N1104.1*
Checklist Item #	[FI6]
Description	To be deemed compliant under the prescriptive or trade-off approach, half of all bulbs installed in permanent fixtures must be high-efficacy. High efficacy bulbs include: compact fluorescent lamps (CFLs), T8 or T5 linear fluorescent lamps, or other lamps (such as LEDs) with an efficacy of ≥ 60 lumens per watt when over 40 watts, ≥50 lumens per watt for 15 to 40 watts, and ≥40 lumens per watt for 15 watts or less.

CFL vs. Incandescent

T12, T8, and T5 Fluorescent Lamps



Heat Pump Thermostat

Code Section	*N1103.1.2*
Checklist Item #	[FI10]
Description	Heat pumps must have a thermostat that will prevent supplemental electric-resistance heat from operating when the heating load can be satisfied by the heat pump.

Masonry Wood Burning Fireplaces

Code Section	*N1102.4.3*
Checklist Item #	[FI8]
Description	All site-built masonry wood burning fireplaces must have outside combustion air and gasketed doors. For more information, see the clarification on this provision for the Georgia DCA from the International Codes Council.

Heated Swimming Pools

Code Section	*N1103.9*
Checklist Item #	[FI12]
Code Value	**N/A**
Description	Heated swimming pools where the water is greater than 90°F must be provided with vapor retardant covers, an R-12 blanket, and controls to allow automatic time control of the circulating pumps and to automatically turn off the pool heating equipment.

Alabama Department of Economic and Community Affiars
Energy Division
401 Adams Avenue
P.O. Box 5690
Montgomery, AL 36103-5690
(334)242-5290
www.adeca.alabama.gov/energy