Above beyond energy

Presentation Overview:

NC Energy Code

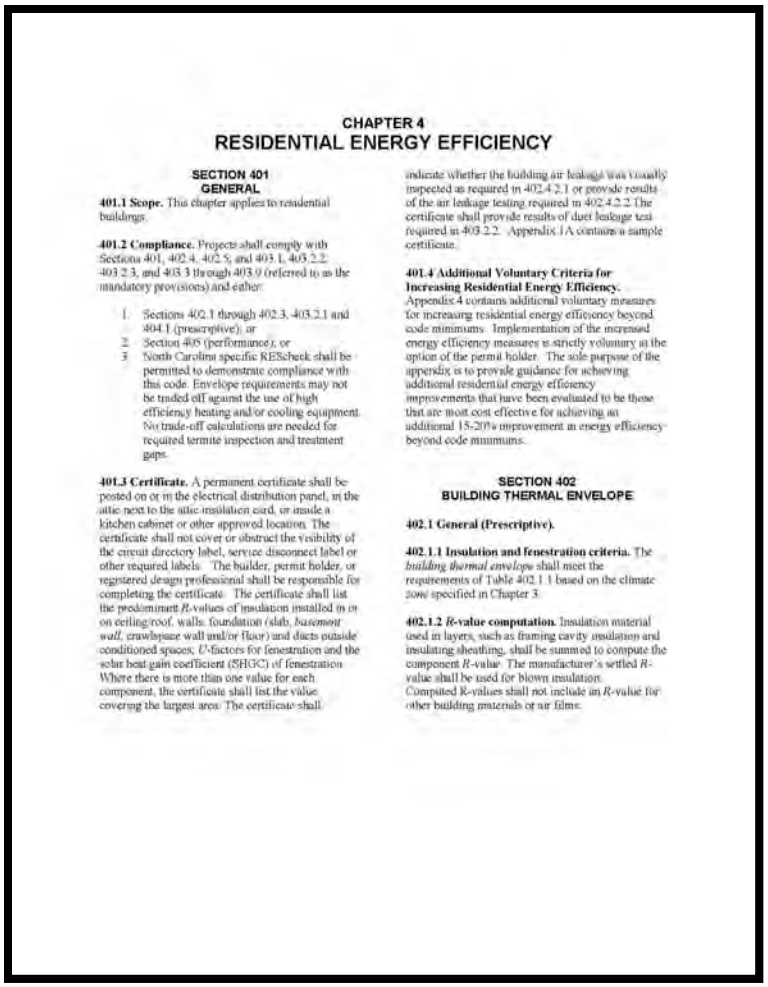
RESNET Standards

HERS Index

HERS Verification Process

DUKE ENERGY PROGRESS PARTICIPATING CONTRACTOR

NC Energy Code Requirements



CHAPTER 4
RESIDENTIAL ENERGY EFFICIENCY

SECTION 401
GENERAL

401.1 Scope. This chapter applies to residential buildings.

401.2 Compliance. Projects shall comply with Sections 401, 402.4, 402.5, and 403.1, 403.2.2, 403.2.3, and 403.3 through 403.9 (referred to as the mandatory provisions) and either:

1. Sections 402.1 through 402.3, 403.2.1 and 404.1 (prescriptive); or
2. Section 405 (performance); or
3. North Carolina specific REScheck shall be permitted to demonstrate compliance with this code. Envelope requirements may not be traded off against the use of high efficiency heating and/or cooling equipment. No trade-off calculations are needed for required termite inspection and treatment gaps.

401.3 Certificate. A permanent certificate shall be posted on or in the electrical distribution panel, in the attic next to the attic insulation card, or inside a kitchen cabinet or other approved location. The certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The builder, permit holder, or registered design professional shall be responsible for completing the certificate. The certificate shall list the predominant *R*-values of insulation installed in or on 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 certificate shall list the value covering the largest area. The certificate shall indicate whether the building air leakage was visually inspected as required in 402.4.2.1 or provide results of the air leakage testing required in 402.4.2.2. The certificate shall provide results of duct leakage test required in 403.2.2. Appendix 1A contains a sample certificate.

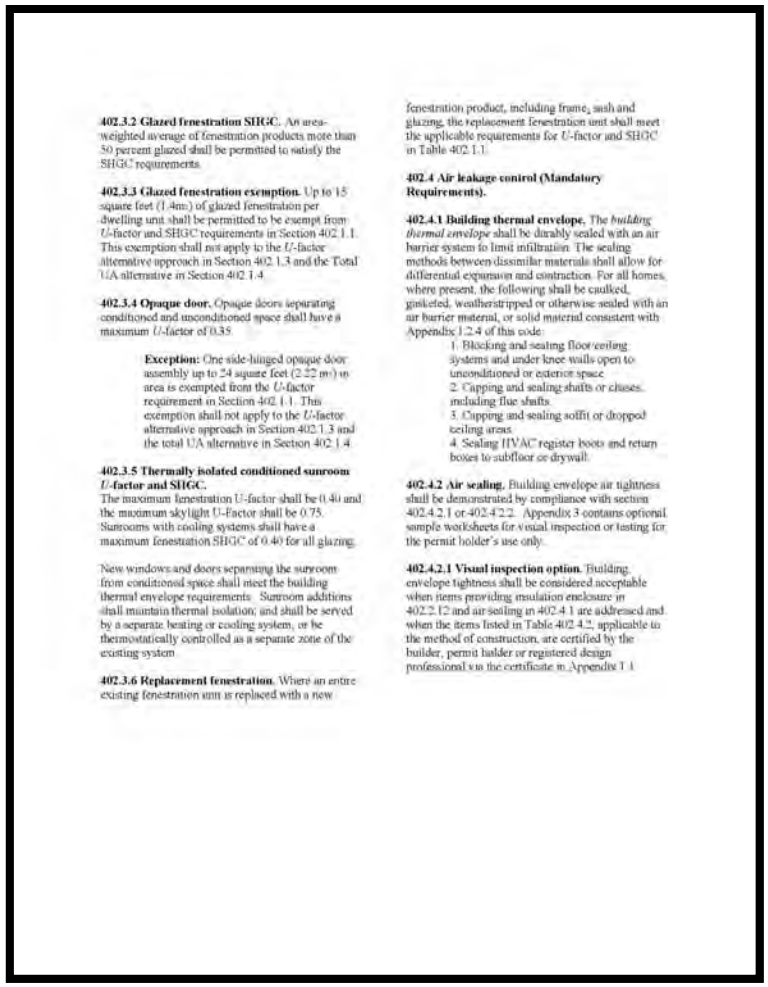
401.4 Additional Voluntary Criteria for Increasing Residential Energy Efficiency. Appendix 4 contains additional voluntary measures for increasing residential energy efficiency beyond code minimums. Implementation of the increased energy efficiency measures is strictly voluntary at the option of the permit holder. The sole purpose of the appendix is to provide guidance for achieving additional residential energy efficiency improvements that have been evaluated to be those that are most cost effective for achieving an additional 15-20% improvement in energy efficiency beyond code minimums.

SECTION 402
BUILDING THERMAL ENVELOPE

402.1 General (Prescriptive).

402.1.1 Insulation and fenestration criteria. The *building thermal envelope* shall meet the requirements of Table 402.1.1 based on the climate zone specified in Chapter 3.

402.1.2 *R*-value computation. Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component *R*-value. The manufacturer's settled *R*-value shall be used for blown insulation. Computed *R*-values shall not include an *R*-value for other building materials or air films.



402.3.2 Glazed fenestration SHGC. An area-weighted average of fenestration products more than 50 percent glazed shall be permitted to satisfy the SHGC requirements.

402.3.3 Glazed fenestration exemption. Up to 15 square feet (1.4m2) of glazed fenestration per dwelling unit shall be permitted to be exempt from *U*-factor and SHGC requirements in Section 402.1.1. This exemption shall not apply to the *U*-factor alternative approach in Section 402.1.3 and the Total UA alternative in Section 402.1.4.

402.3.4 Opaque door. Opaque doors separating conditioned and unconditioned space shall have a maximum *U*-factor of 0.35.

Exception: One side-hinged opaque door assembly up to 24 square feet (2.22 m2) in area is exempted from the *U*-factor requirement in Section 402.1.1. This exemption shall not apply to the *U*-factor alternative approach in Section 402.1.3 and the total UA alternative in Section 402.1.4.

402.3.5 Thermally isolated conditioned sunroom *U*-factor and SHGC. The maximum fenestration U-factor shall be 0.40 and the maximum skylight U-Factor shall be 0.75. Sunrooms with cooling systems shall have a maximum fenestration SHGC of 0.40 for all glazing.

New windows and doors separating the sunroom from conditioned space shall meet the building thermal envelope requirements. Sunroom additions shall maintain thermal isolation; and shall be served by a separate heating or cooling system, or be thermostatically controlled as a separate zone of the existing system.

402.3.6 Replacement fenestration. Where an entire existing fenestration unit is replaced with a new fenestration product, including frame, sash and glazing, the replacement fenestration unit shall meet the applicable requirements for *U*-factor and SHGC in Table 402.1.1.

402.4 Air leakage control (Mandatory Requirements).

402.4.1 Building thermal envelope. The *building thermal envelope* shall be durably sealed with an air barrier system to limit infiltration. The sealing methods between dissimilar materials shall allow for differential expansion and contraction. For all homes, where present, the following shall be caulked, gasketed, weatherstripped or otherwise sealed with an air barrier material, or solid material consistent with Appendix 1.2.4 of this code:

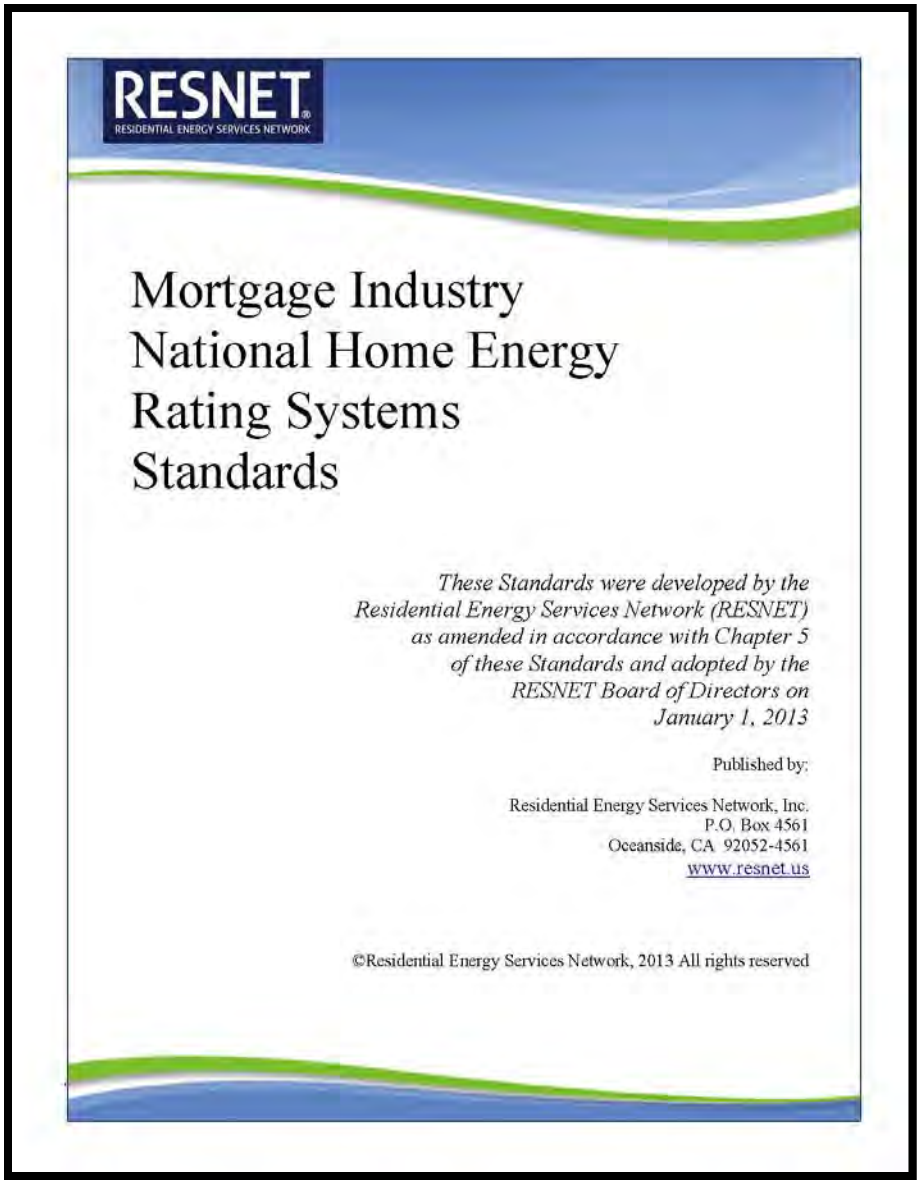
1. Blocking and sealing floor/ceiling systems and under knee walls open to unconditioned or exterior space.
2. Capping and sealing shafts or chases, including flue shafts.
3. Capping and sealing soffit or dropped ceiling areas.
4. Sealing HVAC register boots and return boxes to subfloor or drywall.

402.4.2 Air sealing. Building envelope air tightness shall be demonstrated by compliance with section 402.4.2.1 or 402.4.2.2. Appendix 3 contains optional sample worksheets for visual inspection or testing for the permit holder's use only.

402.4.2.1 Visual inspection option. Building envelope tightness shall be considered acceptable when items providing insulation enclosure in 402.2.12 and air sealing in 402.4.1 are addressed and when the items listed in Table 402.4.2, applicable to the method of construction, are certified by the builder, permit holder or registered design professional via the certificate in Appendix 1.1.

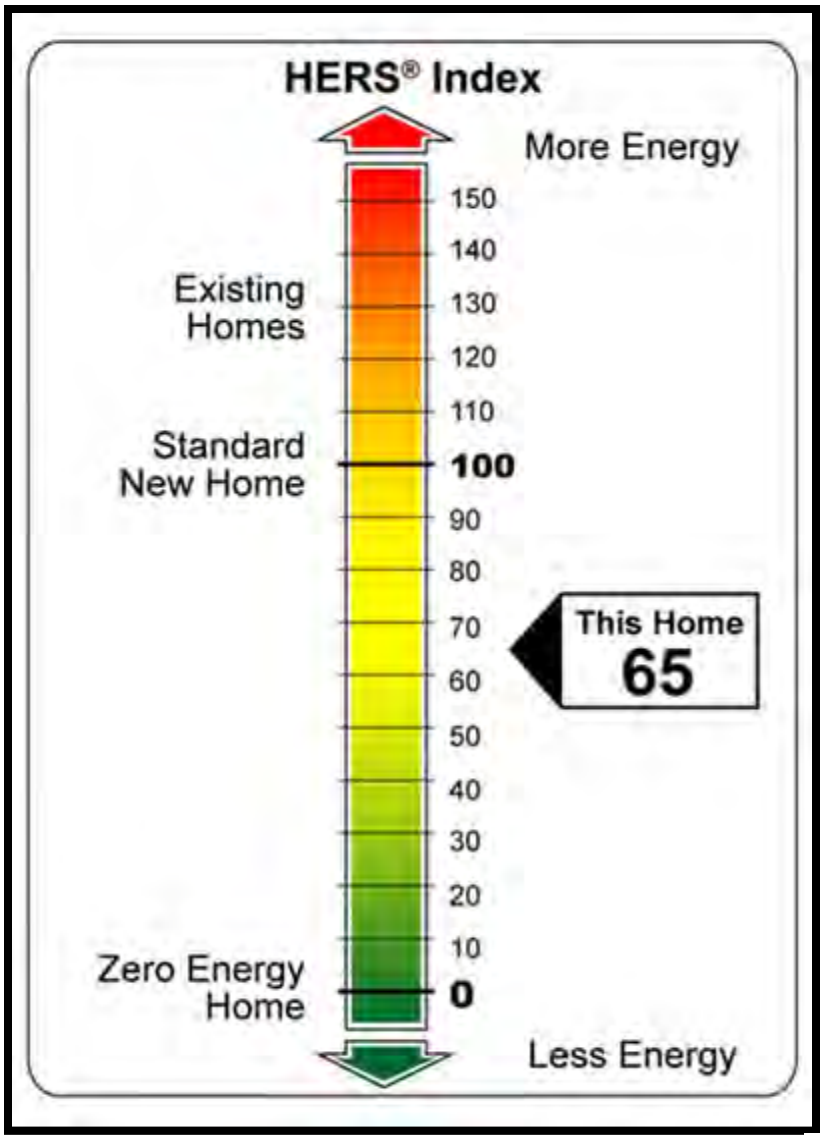
ENERGY STAR and NC Energy Code in Alignment

RESNET Standards

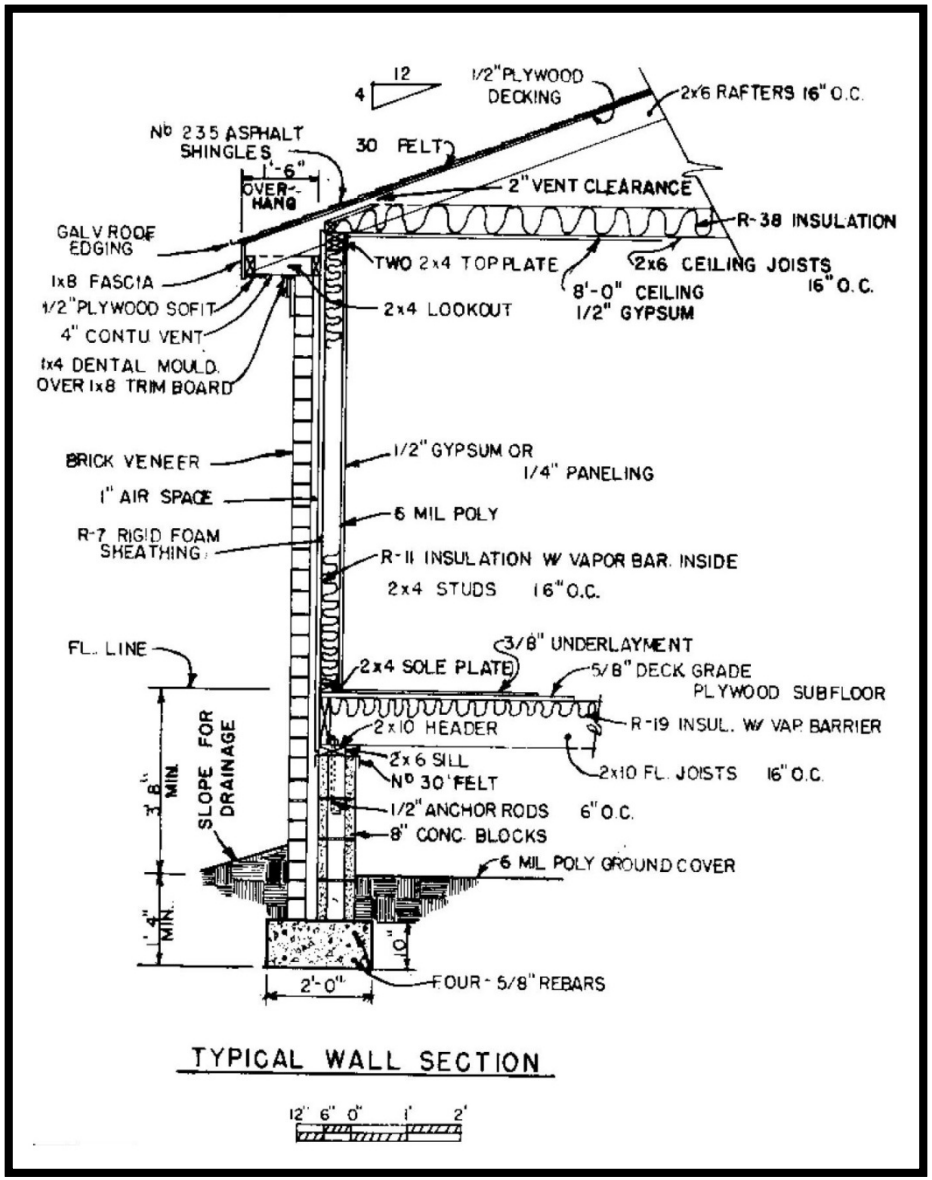


HERS Index

- A scoring system established by RESNET in which the home's HERS score is based from the home's energy efficiency.
- Relatable to miles per gallon
- The Department of Energy has given a standard home a rating of 100 (Reference Home).
- Each HERS Index point represents a percentage point as compared to code.
- The lower the score, the better.



Variables in a HERS Score



- Square Footage
- Number of Bedrooms
- Home orientation

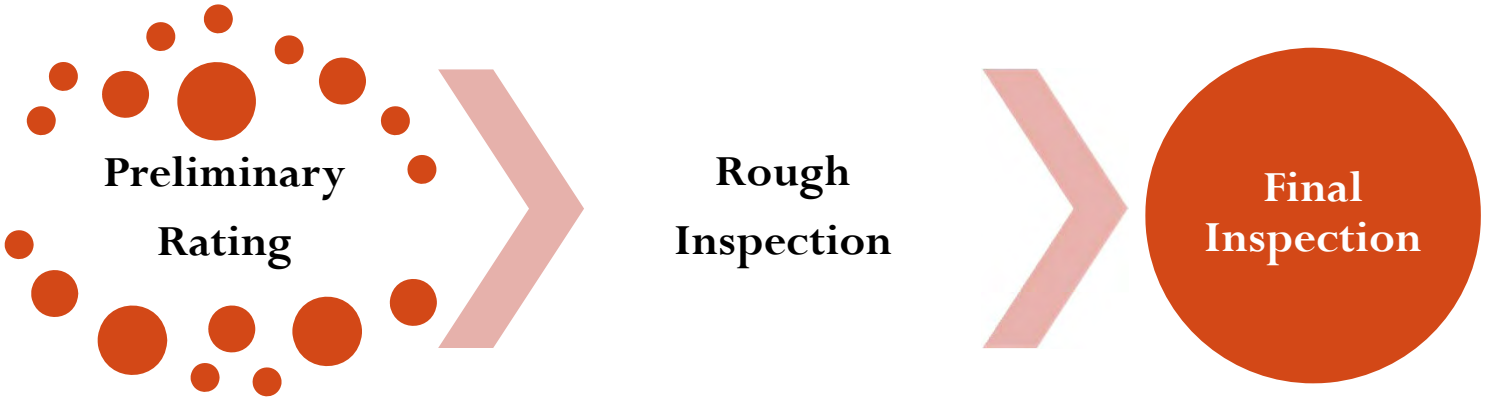
Properties of:

- Crawl space
- Frame floors
- Exterior walls
- Fenestration (windows, doors, etc.)
- Ceilings
- HVAC & DHW efficiencies
- Mechanical ventilation
- Envelope & duct leakage
- Lights & appliances
- Solar & geothermal

Strong HERS Index Drivers

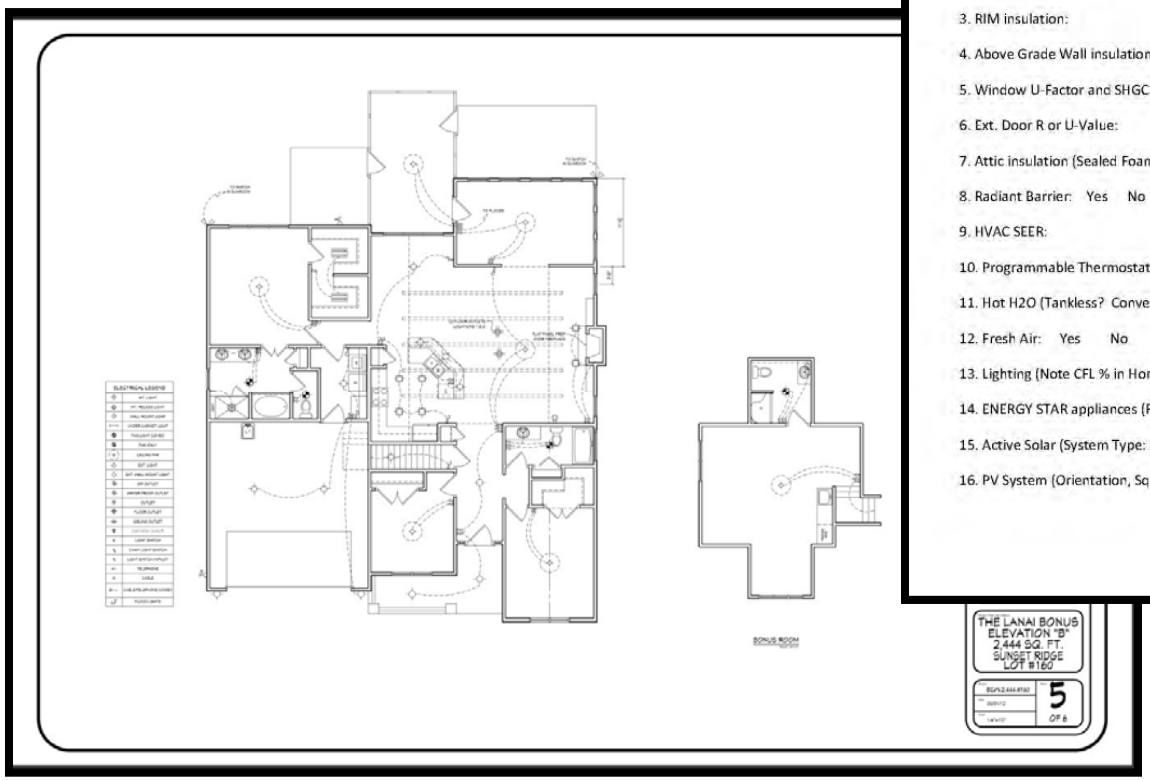
- HVAC & ducts in conditioned space
- Ductless mini-split systems
- Tight envelope with mechanical fresh air
- Lower window to wall and floor ratios
- Continuous insulation
- Slab edge insulation
- Hybrid & tank-less water heaters
- Radiant barrier roof sheathing
- Renewable / Solar Energy
- High efficiency lighting
- High efficiency HVAC

HERS Rating Verification Process



Preliminary Rating:

Plans & Inputs



Plan Review

Spec Request Form

Please fax to 910-791-7608 OR e-mail it to Melissa at melissa@aboveandbeyondenergy.com

Builder & Contact's Name:
Contact's Phone:
Contact's Email:
Address of Home:
Development Name:
Utility Names (Electric & Gas):

Note: Please provide as much specific information as possible even if not listed on sheet. For ALL insulation, specify the R-Value & type, whether it's blown-in, batted, or drape, and whether it's fiberglass, cellulose, or some other product.

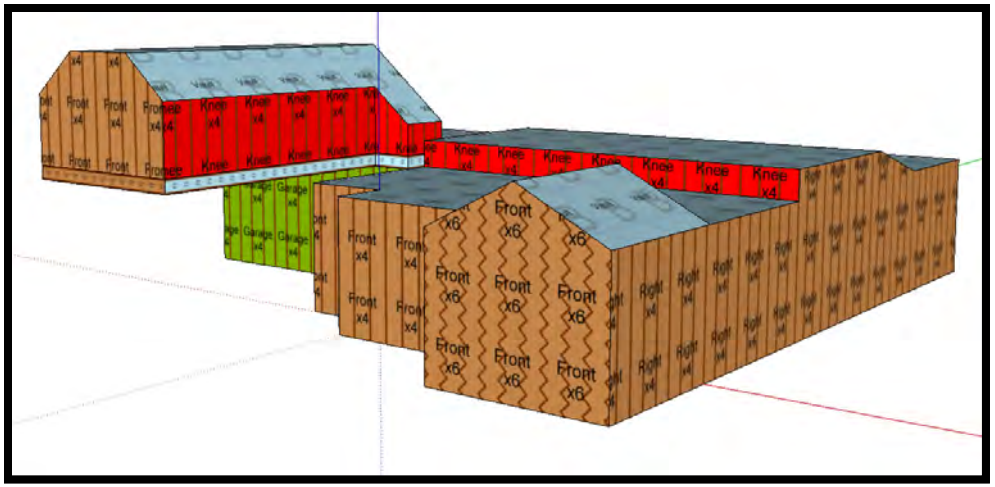
1. Crawl Type (Sealed? Conditioned? Vented? Please indicate insulation type & R-value):
2. Frame Floors insulation:
3. RIM insulation:
4. Above Grade Wall insulation (Note if 2x4 and/or 2x6 or other & insulation type):
5. Window U-Factor and SHGC values:
6. Ext. Door R or U-Value:
7. Attic insulation (Sealed Foamed Attic? Blown? Batt?):
8. Radiant Barrier: Yes No
9. HVAC SEER: HSPF: Tonnage: System Location:
10. Programmable Thermostat: Yes No
11. Hot H2O (Tankless? Conventional? Gas/Electric? Please note Energy Factor?):
12. Fresh Air: Yes No
13. Lighting (Note CFL % in Home):
14. ENERGY STAR appliances (Refrigerator, Dishwasher): Yes No
15. Active Solar (System Type: DHW, Space heating? Orientation, Sq. Ft, Tilt, Volume):
16. PV System (Orientation, Sq. Ft, Watts, Tilt, Inverter Efficiency):

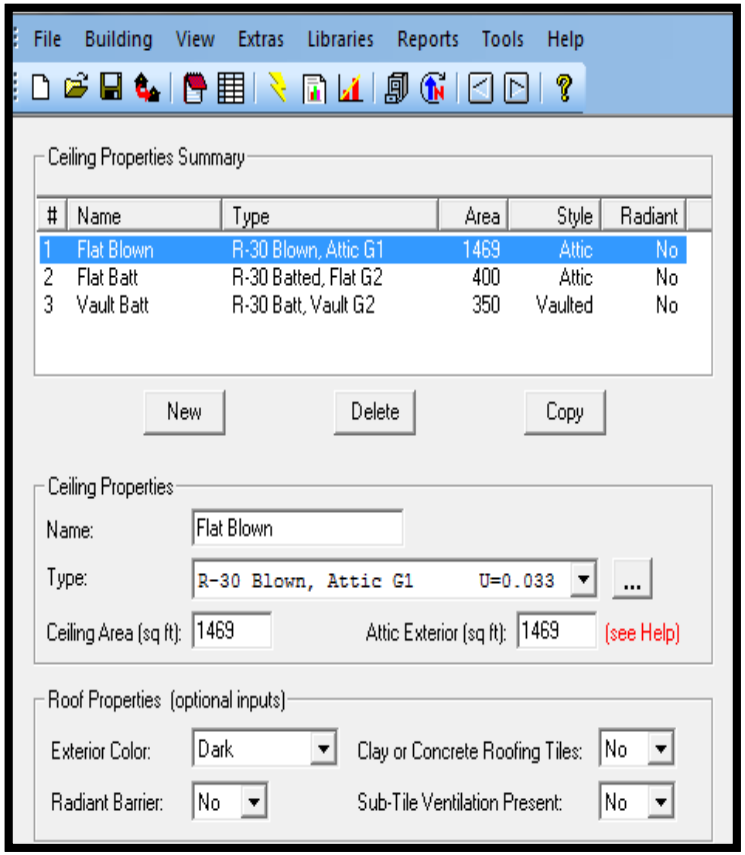
Preliminary Rating:

Energy Modeling

An analysis of the home's building plans along with the energy efficiency specifications.

- This process also involves the use of both, a 3D modeling & energy modeling software.
- This analysis yields a projected, pre-construction HERS score for the builder.



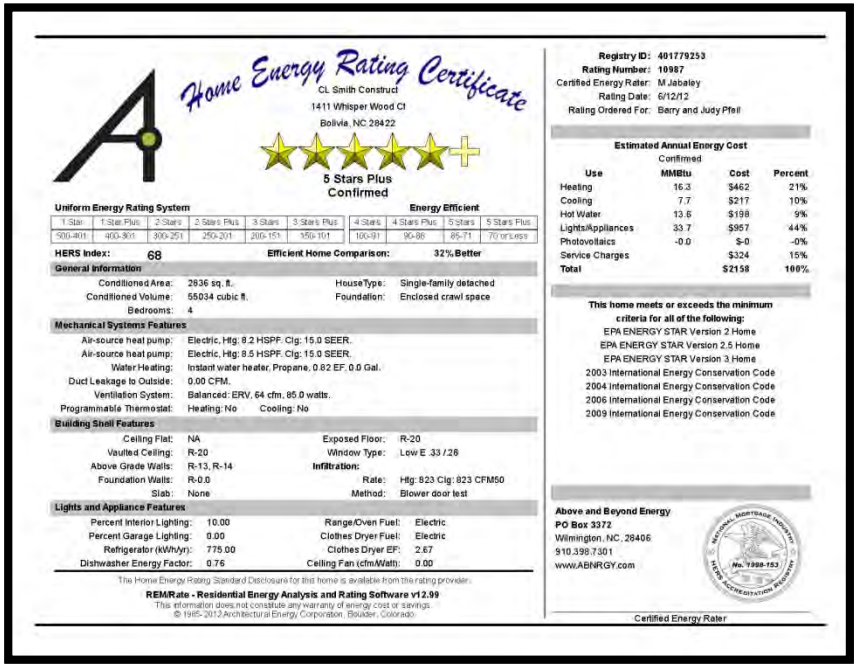


Preliminary Rating:

Reports

- Energy model confirms compliance with desired program or code

- Predicts HERS Index, rebate amount, & energy and $ savings



Home Energy Rating Certificate

CL Smith Construct
1411 Whisper Wood Ct
Bolivia, NC 28422

5 Stars Plus
Confirmed

Uniform Energy Rating System — Energy Efficient

1 Star	1 Star Plus	2 Stars	2 Stars Plus	3 Stars	3 Stars Plus	4 Stars	4 Stars Plus	5 Stars	5 Stars Plus
500-401	400-301	300-251	250-201	200-151	150-101	100-91	90-86	85-71	70 or Less

HERS Index: 68 — Efficient Home Comparison: 32% Better

General Information

Conditioned Area:	2836 sq. ft.	HouseType:	Single-family detached
Conditioned Volume:	55034 cubic ft.	Foundation:	Enclosed crawl space
Bedrooms:	4		

Mechanical Systems Features

Air-source heat pump:	Electric, Htg: 8.2 HSPF, Clg: 15.0 SEER.
Air-source heat pump:	Electric, Htg: 8.5 HSPF, Clg: 15.0 SEER.
Water Heating:	Instant water heater, Propane, 0.82 EF, 0.0 Gal.
Duct Leakage to Outside:	0.00 CFM.
Ventilation System:	Balanced: ERV, 64 cfm, 85.0 watts.
Programmable Thermostat:	Heating: No Cooling: No

Building Shell Features

Ceiling Flat:	NA	Exposed Floor:	R-20
Vaulted Ceiling:	R-20	Window Type:	Low E .33 /.28
Above Grade Walls:	R-13, R-14	Infiltration:	
Foundation Walls:	R-0.0	Rate:	Htg: 823 Clg: 823 CFM50
Slab:	None	Method:	Blower door test

Lights and Appliance Features

Percent Interior Lighting:	10.00	Range/Oven Fuel:	Electric
Percent Garage Lighting:	0.00	Clothes Dryer Fuel:	Electric
Refrigerator (kWh/yr):	775.00	Clothes Dryer EF:	2.67
Dishwasher Energy Factor:	0.76	Ceiling Fan (cfm/Watt):	0.00

The Home Energy Rating Standard Disclosure for this home is available from the rating provider.

REM/Rate - Residential Energy Analysis and Rating Software v12.99
This information does not constitute any warranty of energy cost or savings.
© 1985-2012 Architectural Energy Corporation, Boulder, Colorado

Registry ID: 401779253
Rating Number: 10987
Certified Energy Rater: M Jabaley
Rating Date: 6/12/12
Rating Ordered For: Barry and Judy Pfeil

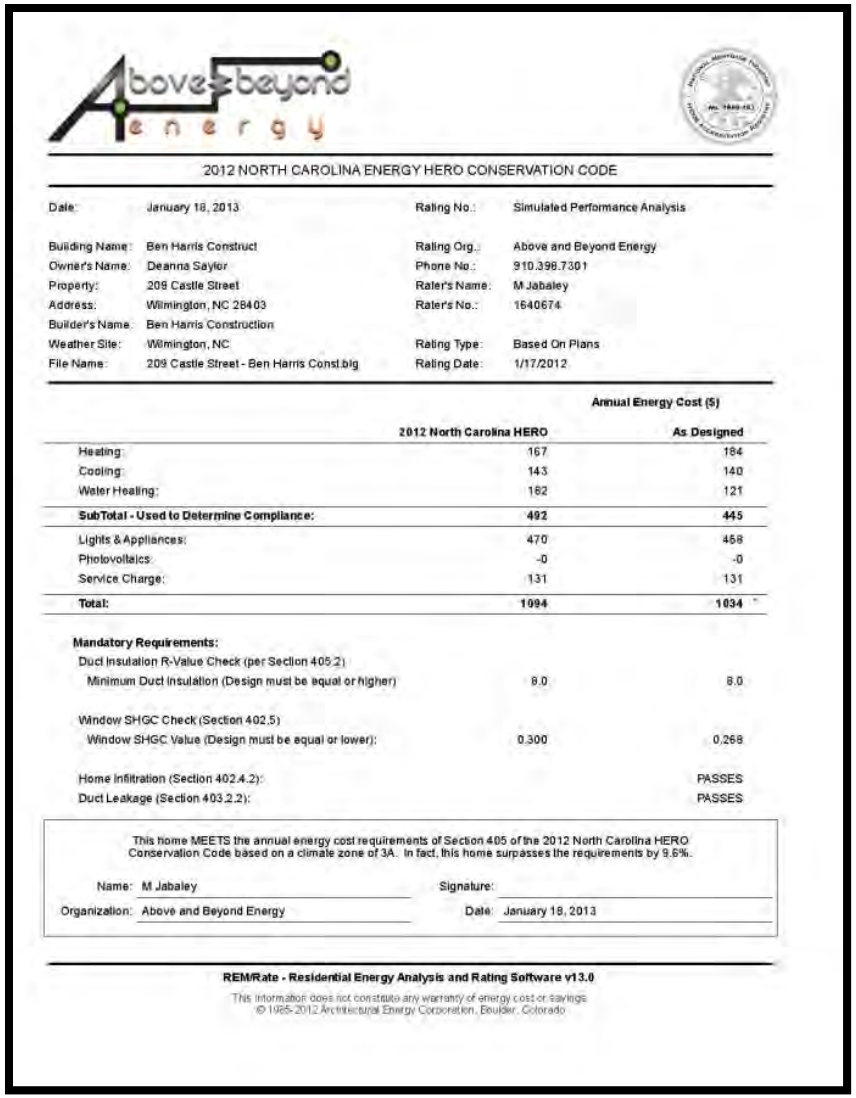
Estimated Annual Energy Cost
Confirmed

Use	MMBtu	Cost	Percent
Heating	16.3	$462	21%
Cooling	7.7	$217	10%
Hot Water	13.6	$198	9%
Lights/Appliances	33.7	$957	44%
Photovoltaics	-0.0	$-0	-0%
Service Charges		$324	15%
Total		$2158	100%

This home meets or exceeds the minimum criteria for all of the following:
EPA ENERGY STAR Version 2 Home
EPA ENERGY STAR Version 2.5 Home
EPA ENERGY STAR Version 3 Home
2003 International Energy Conservation Code
2004 International Energy Conservation Code
2006 International Energy Conservation Code
2009 International Energy Conservation Code

Above and Beyond Energy
PO Box 3372
Wilmington, NC, 28406
910.398.7301
www.ABNRGY.com

Certified Energy Rater



Above beyond energy

2012 NORTH CAROLINA ENERGY HERO CONSERVATION CODE

Date:	January 18, 2013	Rating No.:	Simulated Performance Analysis
Building Name:	Ben Harris Construct	Rating Org.:	Above and Beyond Energy
Owner's Name:	Deanna Saylor	Phone No.:	910.398.7301
Property:	209 Castle Street	Rater's Name:	M Jabaley
Address:	Wilmington, NC 28403	Rater's No.:	1640674
Builder's Name:	Ben Harris Construction		
Weather Site:	Wilmington, NC	Rating Type:	Based On Plans
File Name:	209 Castle Street - Ben Harris Const.blg	Rating Date:	1/17/2012

	Annual Energy Cost ($)	
	2012 North Carolina HERO	As Designed
Heating:	167	184
Cooling:	143	140
Water Heating:	182	121
SubTotal - Used to Determine Compliance:	**492**	**445**
Lights & Appliances:	470	458
Photovoltaics:	-0	-0
Service Charge:	131	131
Total:	**1094**	**1034**

Mandatory Requirements:

Duct Insulation R-Value Check (per Section 405.2)		
Minimum Duct Insulation (Design must be equal or higher)	8.0	8.0
Window SHGC Check (Section 402.5)		
Window SHGC Value (Design must be equal or lower):	0.300	0.268
Home Infiltration (Section 402.4.2):		PASSES
Duct Leakage (Section 403.2.2):		PASSES

This home MEETS the annual energy cost requirements of Section 405 of the 2012 North Carolina HERO Conservation Code based on a climate zone of 3A. In fact, this home surpasses the requirements by 9.6%.

Name: M Jabaley — Signature:
Organization: Above and Beyond Energy — Date: January 18, 2013

REM/Rate - Residential Energy Analysis and Rating Software v13.0

This information does not constitute any warranty of energy cost or savings.
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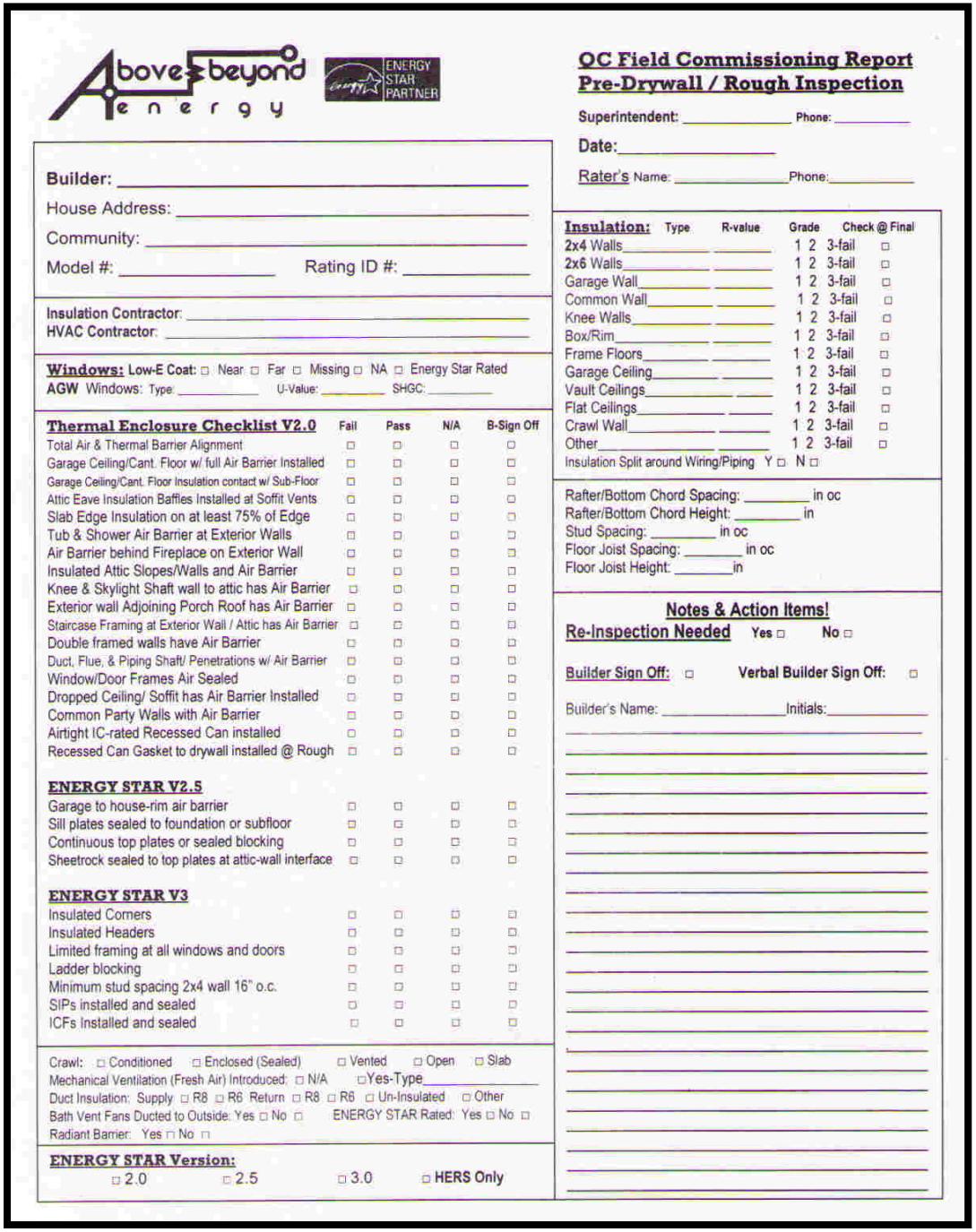


Above & beyond Energy

ENERGY STAR PARTNER

QC Field Commissioning Report
Pre-Drywall / Rough Inspection

Superintendent: _____ Phone: _____

Date: _____

Rater's Name: _____ Phone: _____

Builder: _____

House Address: _____

Community: _____

Model #: _____ Rating ID #: _____

Insulation Contractor: _____

HVAC Contractor: _____

Windows: Low-E Coat: ☐ None ☐ Far ☐ Missing ☐ NA ☐ Energy Star Rated

AGW Windows: Type: _____ U-Value: _____ SHGC: _____

Thermal Enclosure Checklist V2.0	Fail	Pass	N/A	B-Sign Off
Total Air & Thermal Barrier Alignment	☐	☐	☐	☐
Garage Ceiling/Cant. Floor w/ full Air Barrier Installed	☐	☐	☐	☐
Garage Ceiling/Cant. Floor Insulation contact w/ Sub-Floor	☐	☐	☐	☐
Attic Eave Insulation Baffles Installed at Soffit Vents	☐	☐	☐	☐
Slab Edge Insulation on at least 75% of Edge	☐	☐	☐	☐
Tub & Shower Air Barrier at Exterior Walls	☐	☐	☐	☐
Air Barrier behind Fireplace on Exterior Wall	☐	☐	☐	☐
Insulated Attic Slopes/Walls and Air Barrier	☐	☐	☐	☐
Knee & Skylight Shaft wall to attic has Air Barrier	☐	☐	☐	☐
Exterior wall Adjoining Porch Roof has Air Barrier	☐	☐	☐	☐
Staircase Framing at Exterior Wall / Attic has Air Barrier	☐	☐	☐	☐
Double framed walls have Air Barrier	☐	☐	☐	☐
Duct, Flue, & Piping Shaft/ Penetrations w/ Air Barrier	☐	☐	☐	☐
Window/Door Frames Air Sealed	☐	☐	☐	☐
Dropped Ceiling/ Soffit has Air Barrier Installed	☐	☐	☐	☐
Common Party Walls with Air Barrier	☐	☐	☐	☐
Airtight IC-rated Recessed Can installed	☐	☐	☐	☐
Recessed Can Gasket to drywall installed @ Rough	☐	☐	☐	☐
ENERGY STAR V2.5				
Garage to house-rim air barrier	☐	☐	☐	☐
Sill plates sealed to foundation or subfloor	☐	☐	☐	☐
Continuous top plates or sealed blocking	☐	☐	☐	☐
Sheetrock sealed to top plates at attic-wall interface	☐	☐	☐	☐
ENERGY STAR V3				
Insulated Corners	☐	☐	☐	☐
Insulated Headers	☐	☐	☐	☐
Limited framing at all windows and doors	☐	☐	☐	☐
Ladder blocking	☐	☐	☐	☐
Minimum stud spacing 2x4 wall 16" o.c.	☐	☐	☐	☐
SIPs installed and sealed	☐	☐	☐	☐
ICFs Installed and sealed	☐	☐	☐	☐

Crawl: ☐ Conditioned ☐ Enclosed (Sealed) ☐ Vented ☐ Open ☐ Slab

Mechanical Ventilation (Fresh Air) Introduced: ☐ N/A ☐ Yes-Type _____

Duct Insulation: Supply ☐ R8 ☐ R6 Return ☐ R8 ☐ R6 ☐ Un-Insulated ☐ Other

Bath Vent Fans Ducted to Outside: Yes ☐ No ☐ ENERGY STAR Rated: Yes ☐ No ☐

Radiant Barrier: Yes ☐ No ☐

ENERGY STAR Version:

☐ 2.0 ☐ 2.5 ☐ 3.0 ☐ HERS Only

Insulation: Type	R-value	Grade	Check @ Final
2x4 Walls		1 2 3-fail	☐
2x6 Walls		1 2 3-fail	☐
Garage Wall		1 2 3-fail	☐
Common Wall		1 2 3-fail	☐
Knee Walls		1 2 3-fail	☐
Box/Rim		1 2 3-fail	☐
Frame Floors		1 2 3-fail	☐
Garage Ceiling		1 2 3-fail	☐
Vault Ceilings		1 2 3-fail	☐
Flat Ceilings		1 2 3-fail	☐
Crawl Wall		1 2 3-fail	☐
Other		1 2 3-fail	☐

Insulation Split around Wiring/Piping Y ☐ N ☐

Rafter/Bottom Chord Spacing: _____ in oc

Rafter/Bottom Chord Height: _____ in

Stud Spacing: _____ in oc

Floor Joist Spacing: _____ in oc

Floor Joist Height: _____ in

Notes & Action Items!

Re-Inspection Needed Yes ☐ No ☐

Builder Sign Off: ☐ **Verbal Builder Sign Off:** ☐

Builder's Name: _____ Initials: _____

Verification Process:

Two Rough Inspections

1. Framing Walk - Identifies air sealing and framing air barriers <u>before</u> insulation and other trades.

2. Insulation Inspection- assesses installation quality and verifies other aspects of air sealing and air barriers.

Interior and Exterior Air Barriers

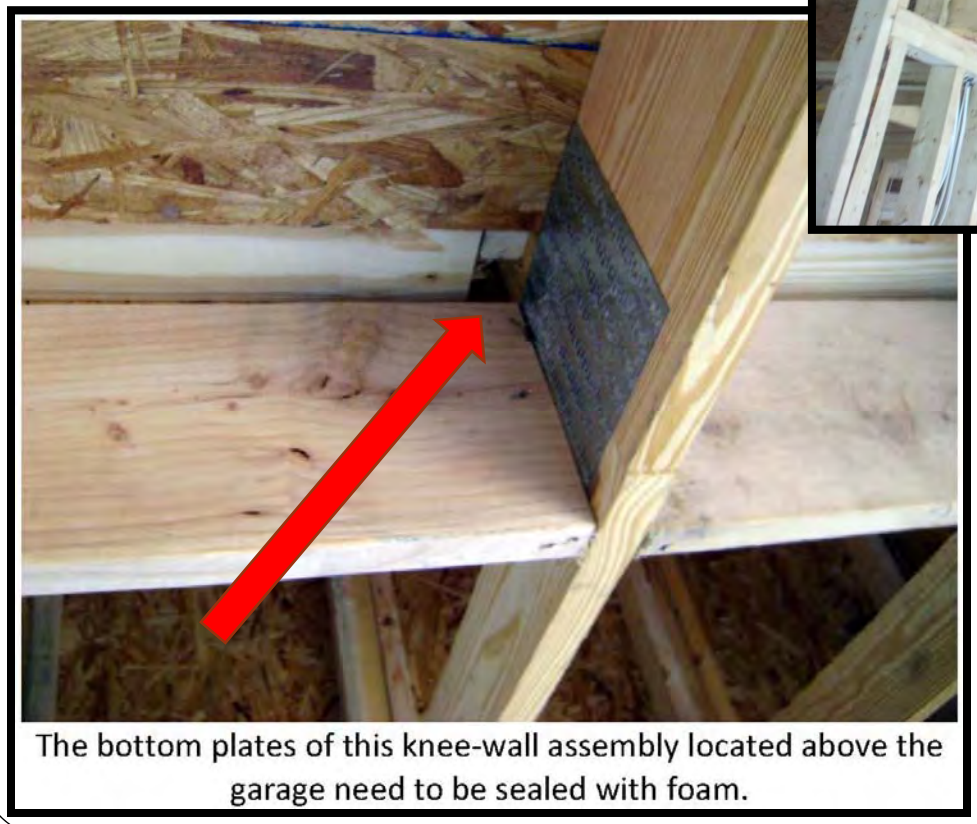
- **Interior** Air Barriers are usually the sheetrock. Sometimes though the drywall will turn and not follow insulation and that Interior Air Barrier must be put back on.

- **Exterior** Air Barriers are usually sheathings and housewraps but sometimes (knee walls in particular) the exterior sheathing must be put back on.

- **Needed:** 6 sided wall assemblies

1. Left Stud
2. Right Stud
3. Top Plate
4. Bottom Plate
5. Exterior Sheathing
6. Interior Drywall

Rough Inspection
Air Barriers & Air Sealing

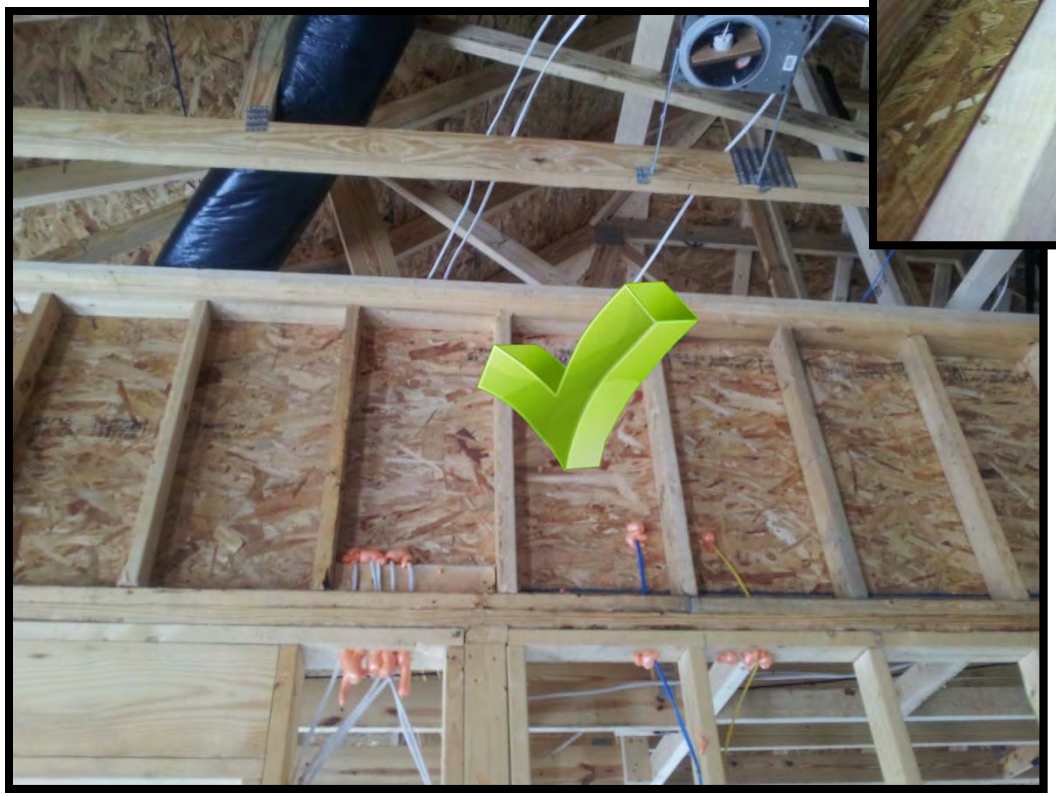


The bottom plates of this knee-wall assembly located above the garage need to be sealed with foam.

- **Air Barriers** are solid materials that don't allow air to pass through them.
- **Air Sealing** fills seams and gaps with caulk or foam.

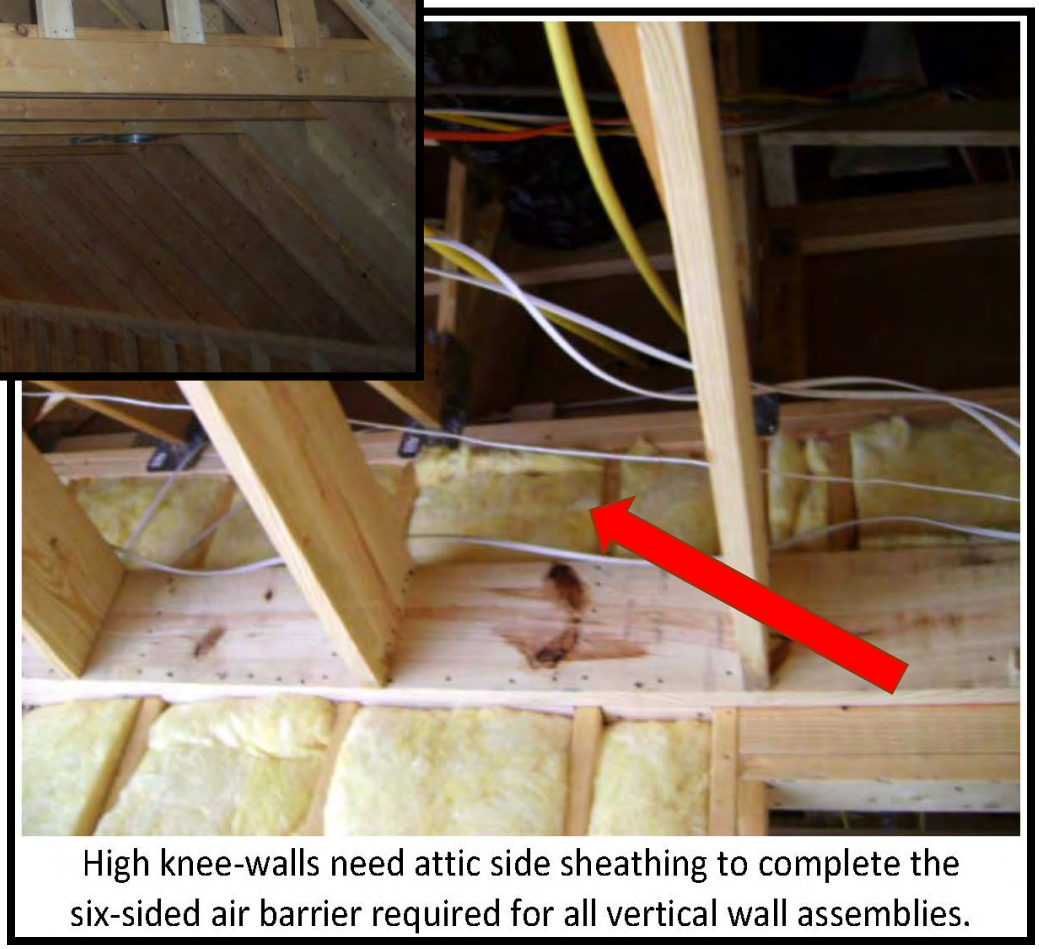
Knee Walls

- **Knee Walls** are defined as a vertical wall with conditioned space on one side and attic on the other.



Knee Walls

- **Must have** 6 sides, full depth



High knee-walls need attic side sheathing to complete the six-sided air barrier required for all vertical wall assemblies.

Knee Walls

- **Needed:**

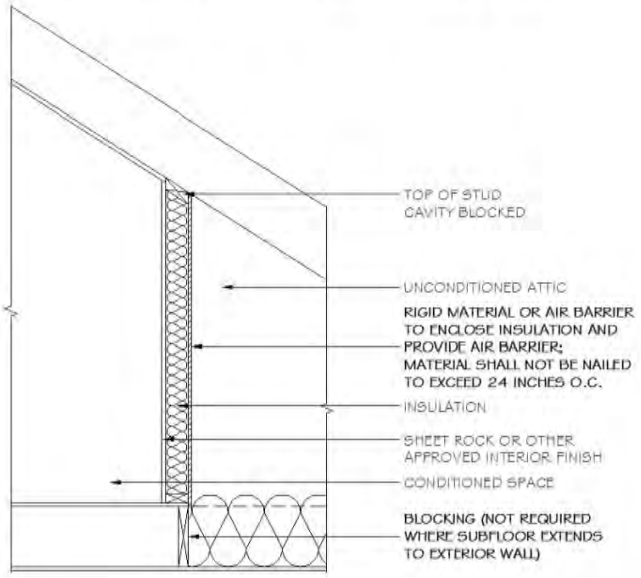
  Blocking under knee walls

Knee Walls

- **Needed:**

  Blocking under knee walls

402.2.12 Framed cavity walls. Insulation enclosure – 5. Walls that adjoin attic spaces



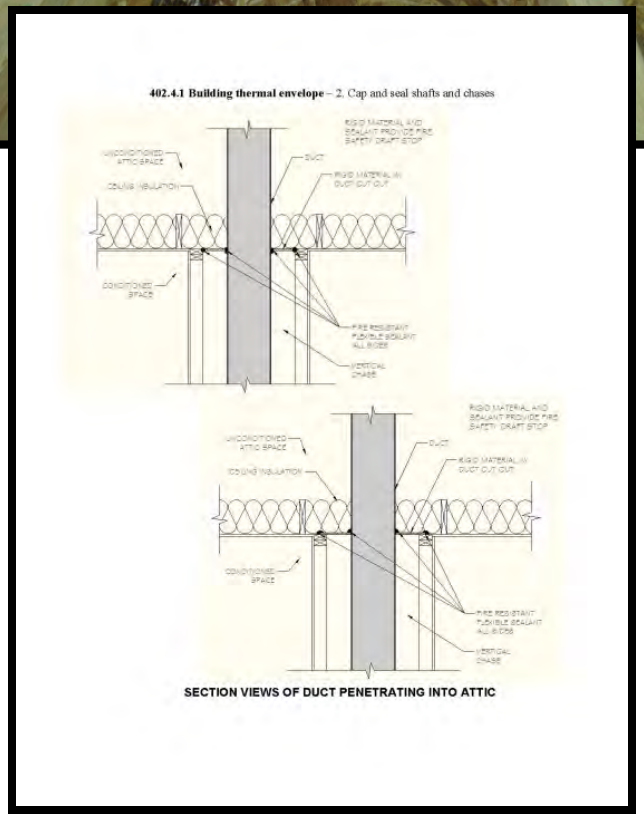
SECTION VIEW OF WALL ADJOINING ATTIC SPACE

Chases

- **Needed:**

  Caps need to be installed.

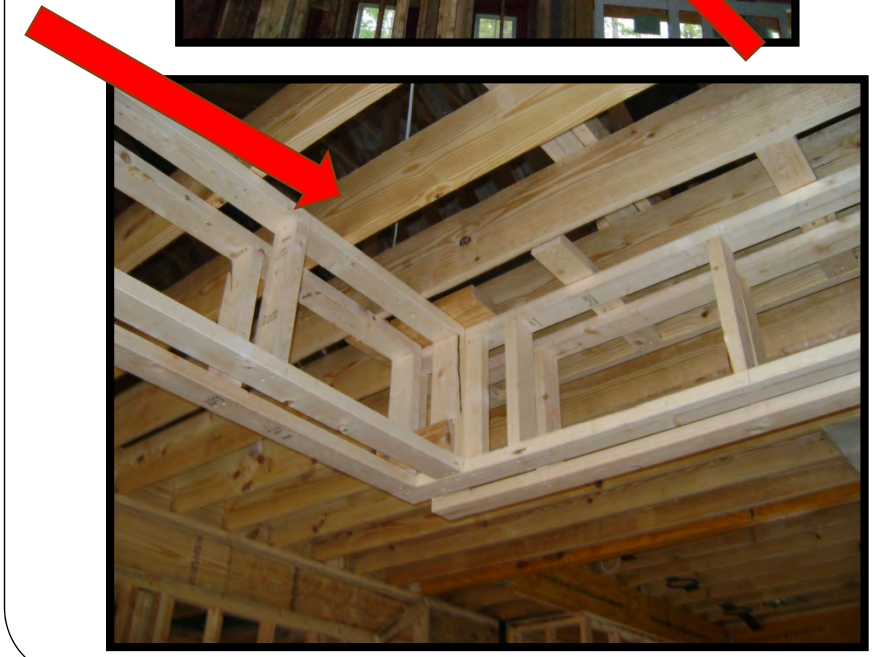
  Air seal with fire-rated caulk to finish job.

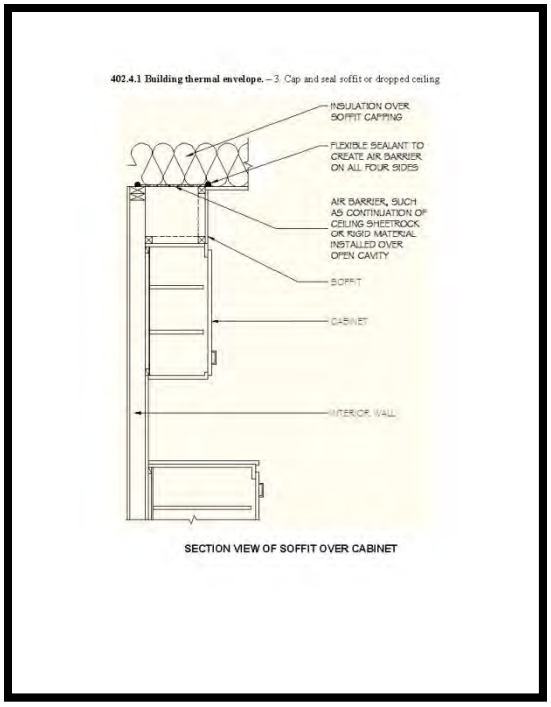


Dropped Ceiling

- **Needed:**

  Caps

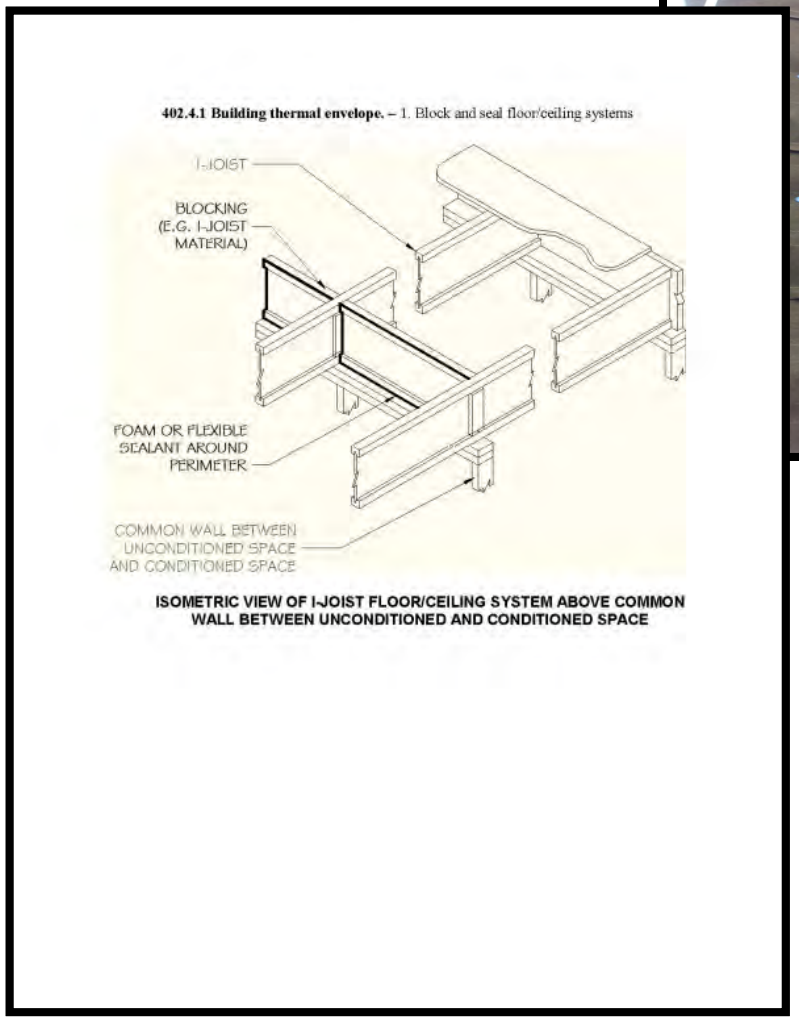


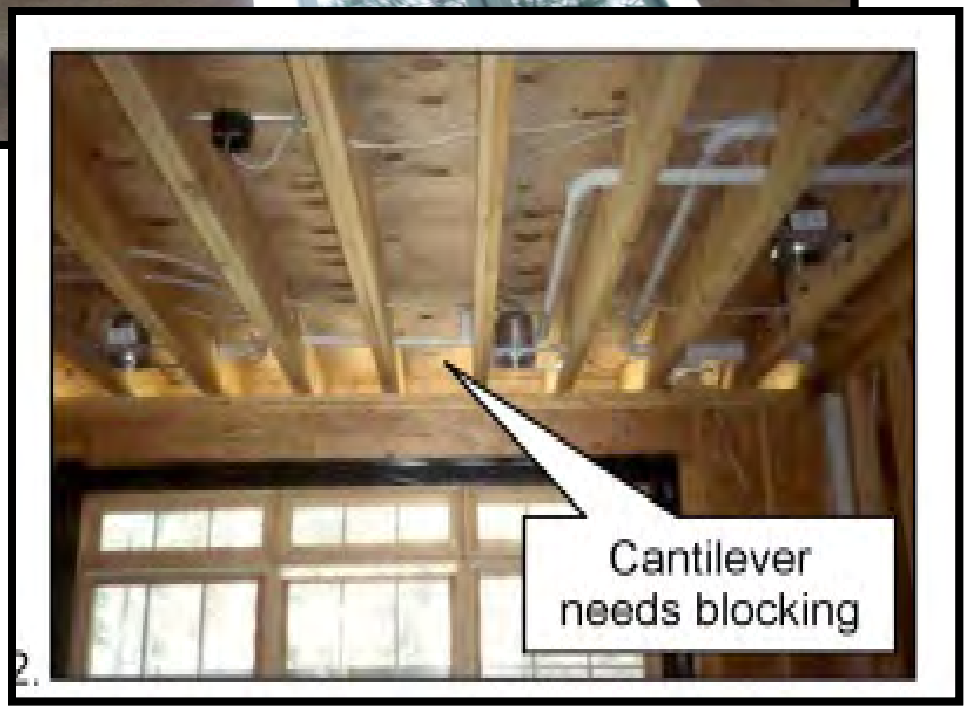


Cantilevers

- **Needed:**

  Blocking

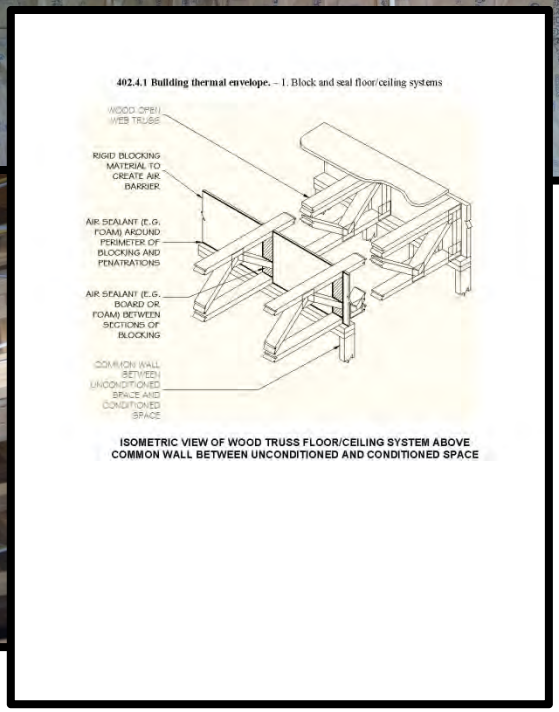




Garage Band Joists (Also Cantilevers)

- **Needed:**

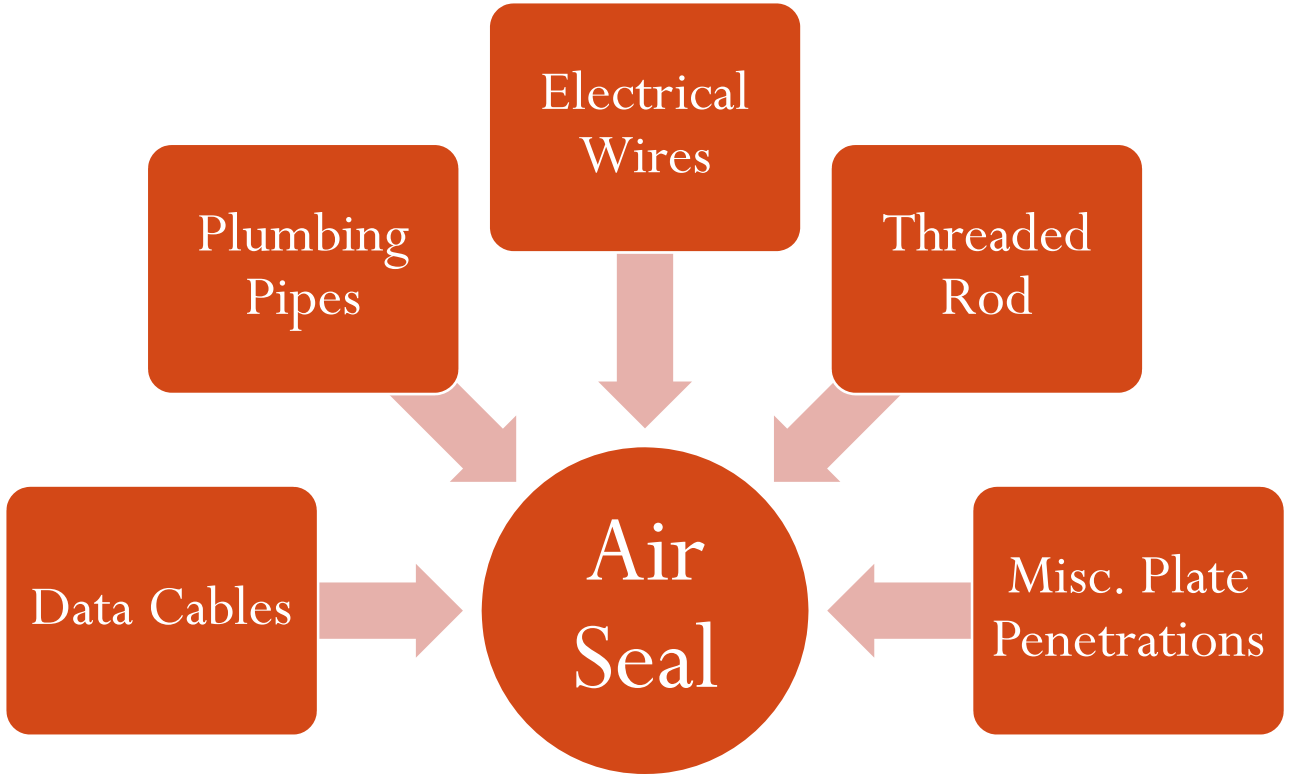
  Blocking



Penetrations

- **Needed:**

  Air Sealing



Penetrations

THERMAL ENCLOSURE SYSTEM RATER CHECKLIST

5 AIR SEALING

1 PENETRATIONS, GAPS, AND HOLES TO UNCONDITIONED SPACE FULLY SEALED

ENERGY STAR

A. Holes have been cut excessively larger than needed making it difficult to seal.

Wiring penetrations have been neatly sealed with foam.

A. Hole was not neatly cut with a saw making it difficult to seal.

Wiring penetrations have been neatly sealed with foam.

B. Hole has not been air sealed.

Wiring penetrations have been neatly sealed with foam.

B. Fibrous insulation is not an air barrier and cannot be used for sealing holes.

Neatly cut hole has been properly sealed with foam.

Last Updated 3/23/11

120

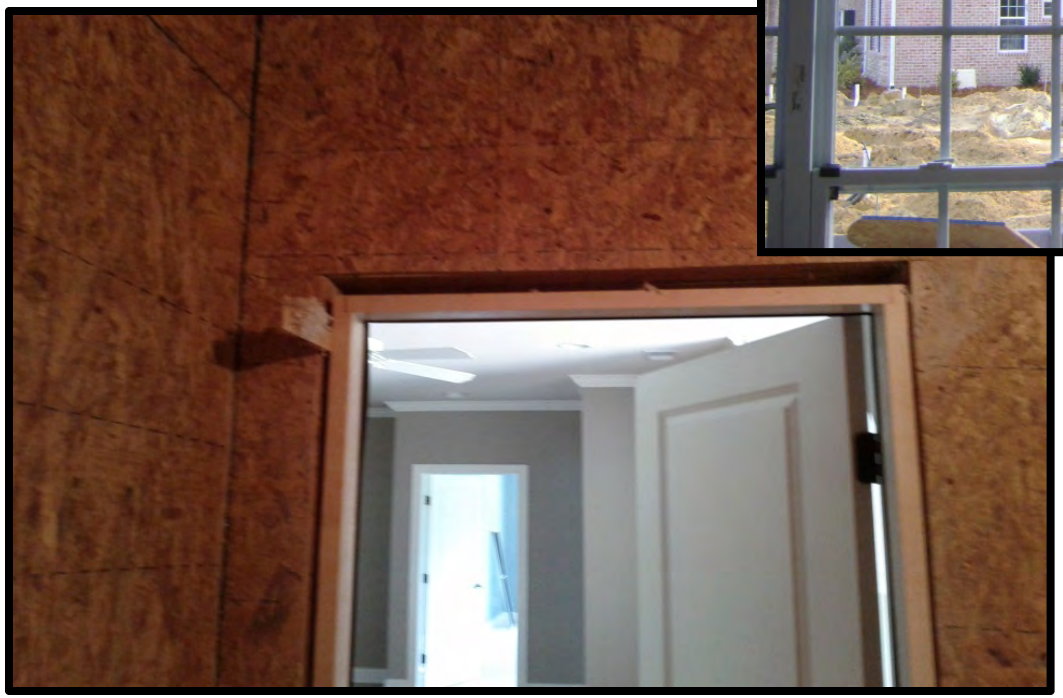
Windows & Doors

- **Needed:**

  Air Sealing

- **NOT Needed:**

  Fiberglass Chinking



Air Sealing
Sill Plates

Air Sealing Top Plates

TABLE 402.4.2
AIR BARRIER INSPECTION

COMPONENT	CRITERIA
Ceiling/attic	Sealants or gaskets provide a continuous air barrier system joining the top plate of framed walls with either the ceiling drywall or the top edge of wall drywall to prevent air leakage. Top plate penetrations are sealed. Fill ceiling fixtures that are not air barrier systems (such as tongue-and-groove planks), air barrier systems (for example, taped house wrap), shall be sealed above the finish. Note: It is acceptable that sealants or gaskets applied as part of this application of the drywall will not be observable by the code official.
Walls	Sill plate is gasketed or sealed to subfloor or slab.
Windows and doors	Space between window and exterior door jambs and framing is sealed.
Floors (including above-garage and cantilevered floors)	Air barrier system is installed at any exposed edge of insulation.
Ventilation	Utility penetrations through the building thermal envelope, including those for plumbing, electrical wiring, ductwork, security and fire alarm wiring, and control wiring, shall be sealed.
Garage separation	Air sealing is provided between the garage and conditioned spaces. An air barrier system shall be installed between the ceiling system above the garage and the ceiling system of interior spaces.
Duct leaks	Sealing HVAC register boots and completion by subfloor or drywall.
Recessed lighting	Recessed light fixtures are air tight, IC rated, and sealed to drywall. **Exception**—fixtures not penetrating the building envelope.

402.4.2.2 Testing options. Building envelope tightness shall be considered acceptable where items providing insulation enclosure in 402.2.12 and air sealing in 402.4.1 are addressed and when tested air leakage is less than or equal to one of the two following performance measurements:

1. 0.30 CFM50/Square Foot of Surface Area (SFSA) or
2. Five (5) air changes per hour (ACH50)

when tested with a blower door fan assembly, at a pressure of 33.5 psf (50 Pa). A single point

During testing:

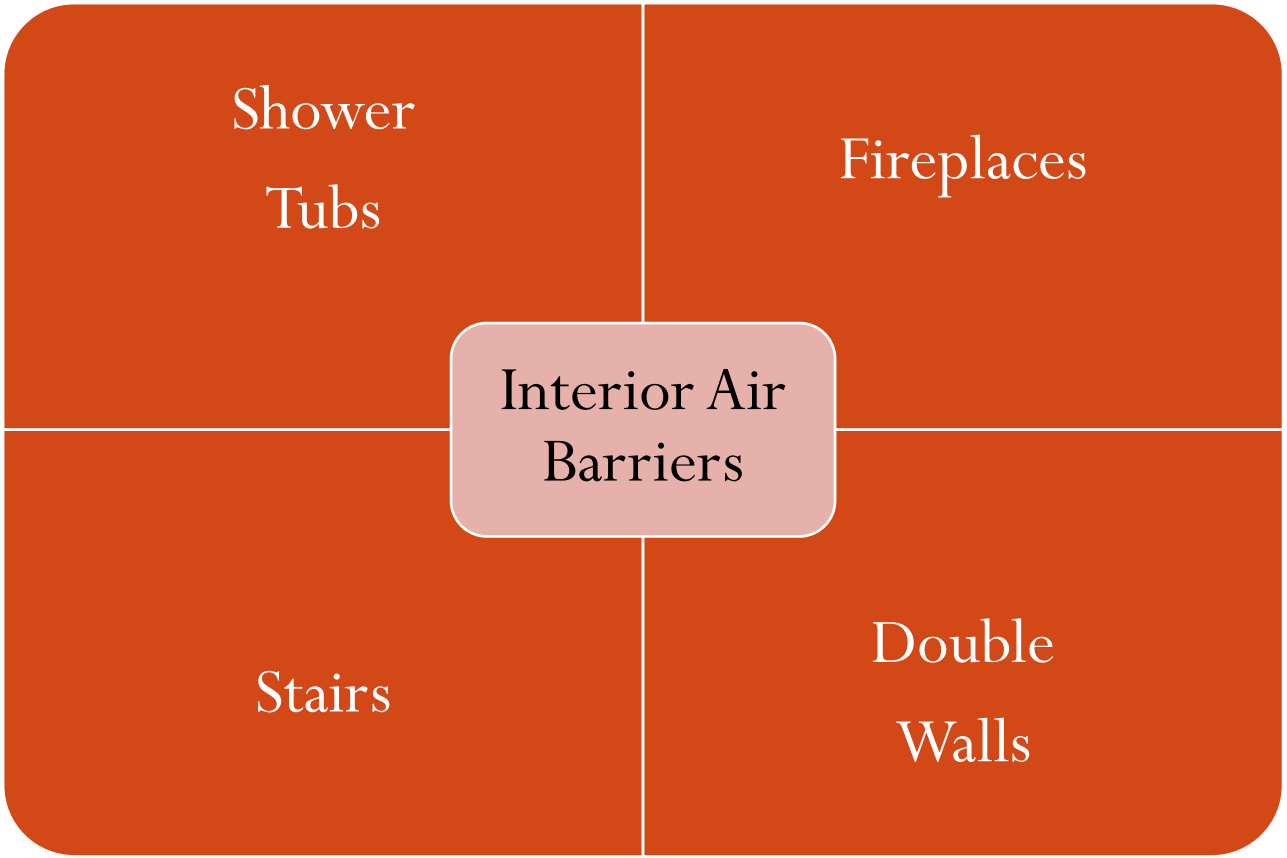
1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed.
2. Dampers shall be closed, but not sealed, including exhaust, backdraft, and flue dampers.
3. Interior doors shall be open.
4. Exterior openings for continuous ventilation systems, air intake ducted to the return side of the conditioning system, and energy or heat recovery ventilators shall be closed and sealed.
5. Heating and cooling system(s) shall be turned off; and
6. Supply and return registers shall not be sealed.

The air leakage information, building air leakage result, tester name, date, and contact information shall be included on the certificate described in Section 401.3.

For Test Criteria 1 above, the report shall be produced in the following manner: perform the

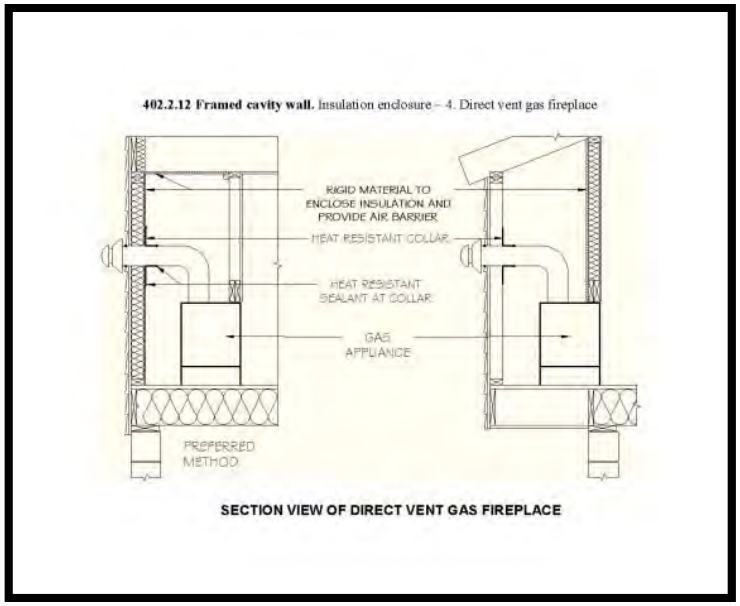
Interior Air Barriers

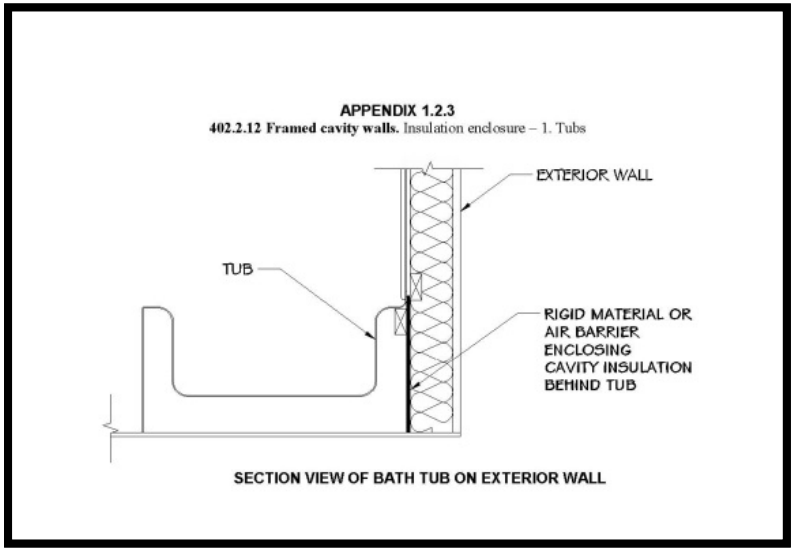
- **Needed at:**



Interior Air Barriers

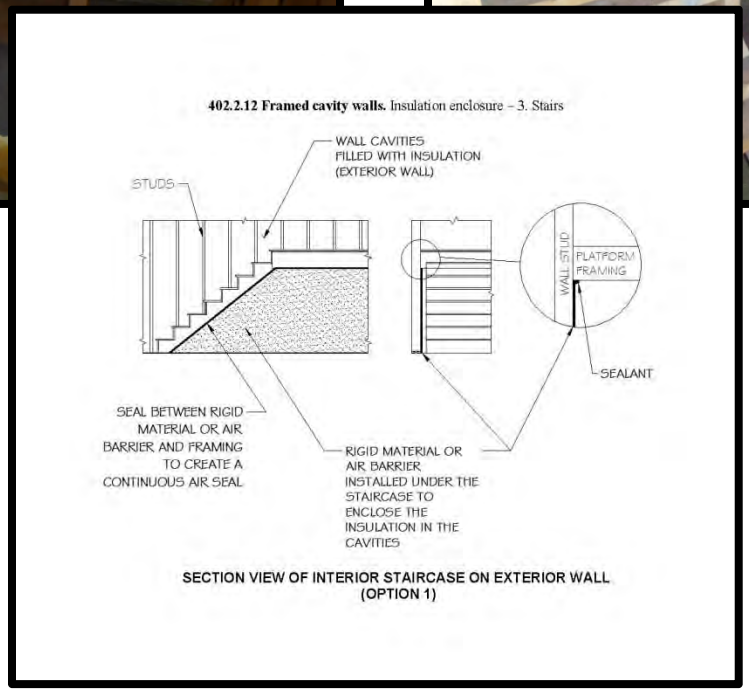
- **Shower and Fireplace**





Interior Air Barriers

- **Under stairs at exterior & garage walls**

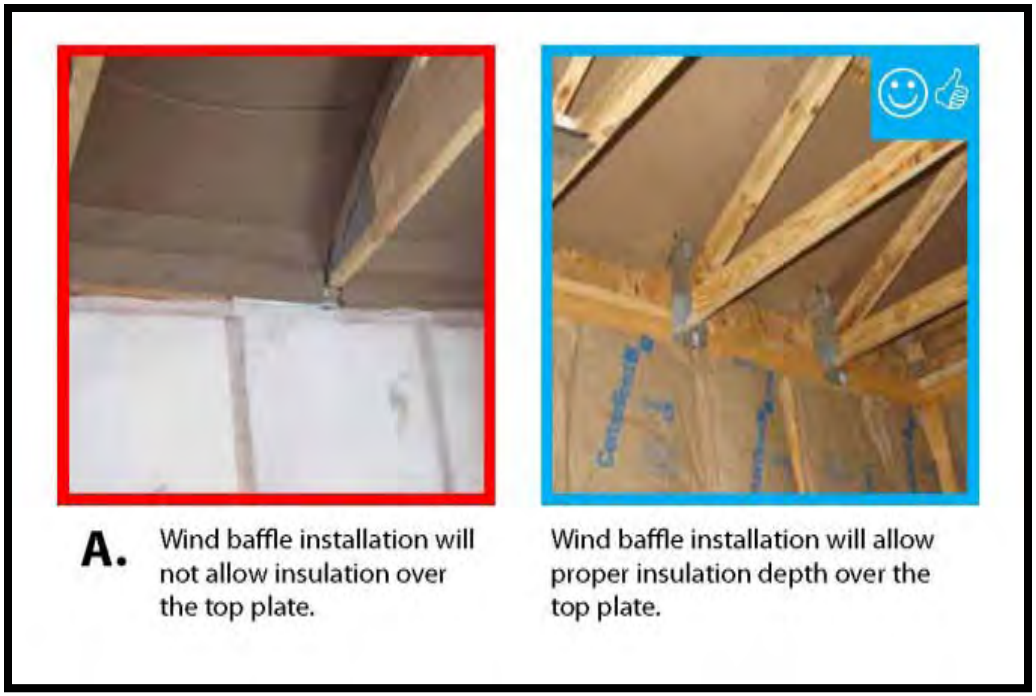


Baffles and Insulation Dams

- **Needed at:**

  Adjacent porches

  Bonus room knee wall



- **Note:**

  Your **Framer** can help where wall is parallel to truss.

Common Walls

- **Needed:**

  Air Sealing

- **NOT Needed:**

  Fiberglass Chinking

Insulation Inspection

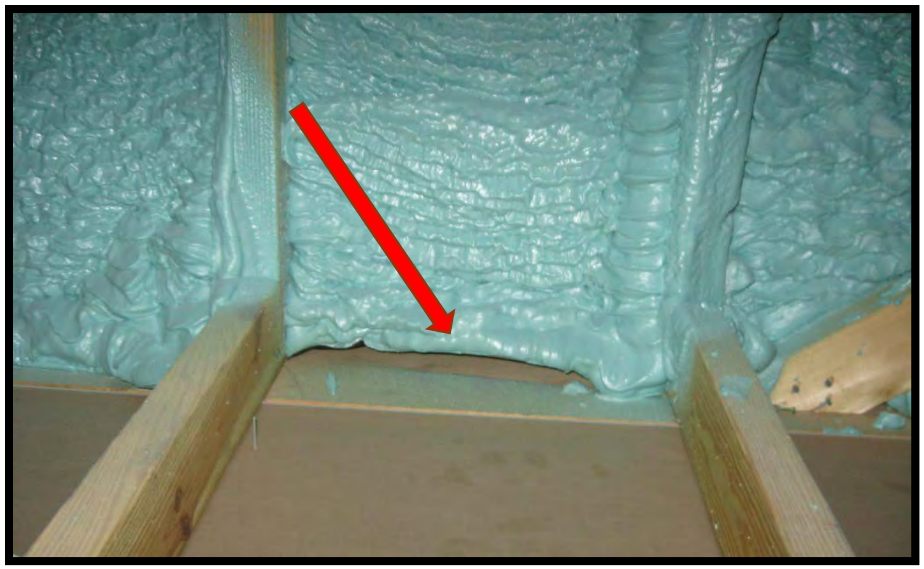
Windows with at least a .35 u-factor and .30 solar heat gain coefficient. These are double paned windows encapsulating argon gas with a low-emissivity coating.

Grade 1 blown-in cellulose insulation. Double top-plates caulked to minimize air infiltration.

Insulation Installation

Floor Insulation

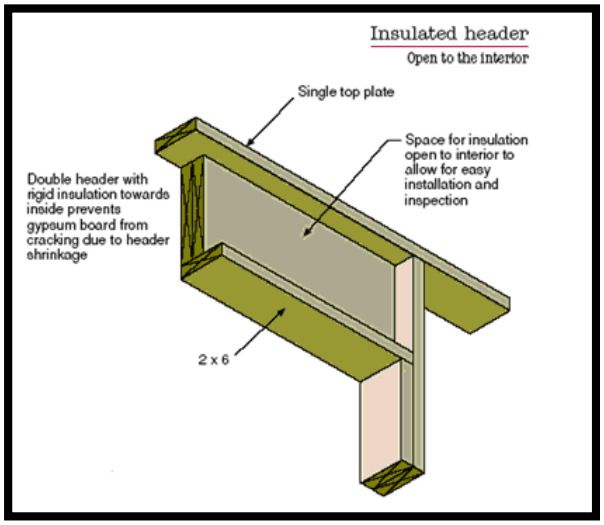
Properly supported and in contact with subfloor above

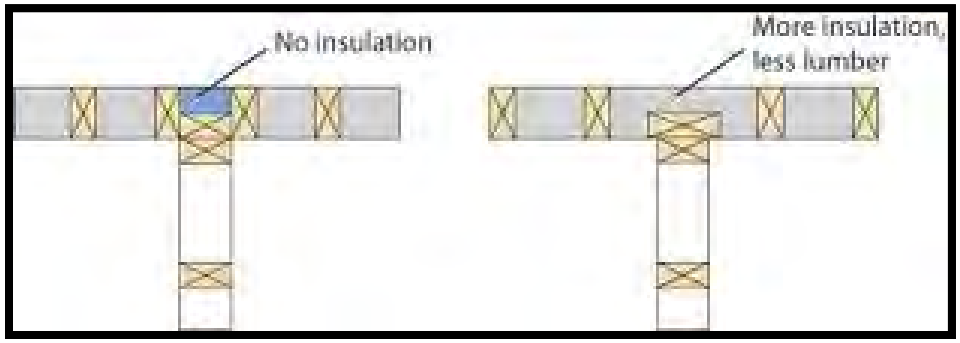


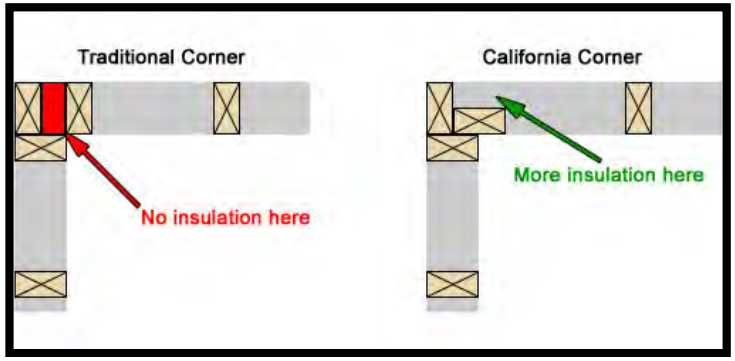
Spray foam can even have installation issues

Options to Consider

- **The Framing Factor**





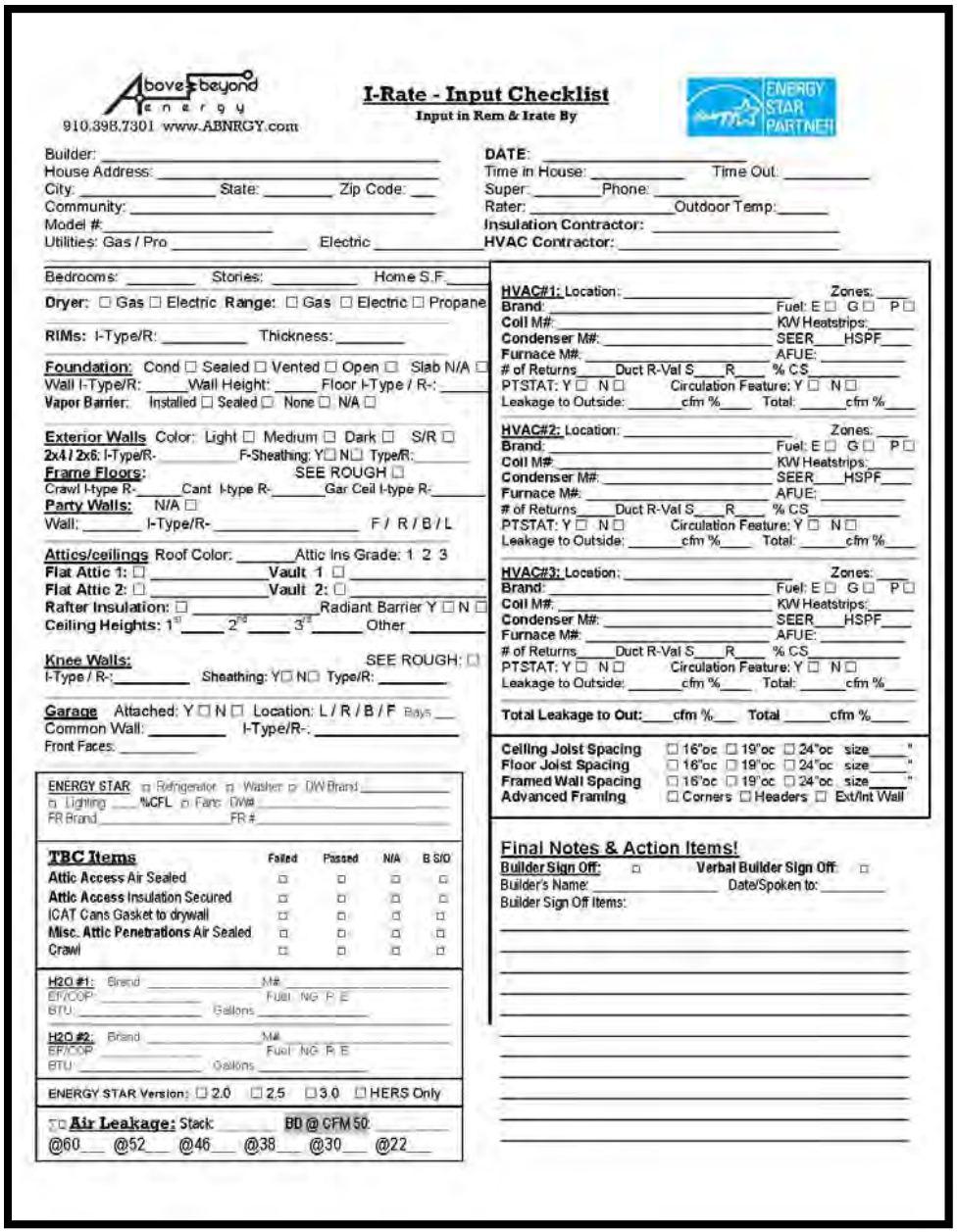


- **Advanced Framing Techniques**

Verification Process:

Final Inspection

- Field Verification of rated features in homes confirming energy specs in preliminary rating.
- Includes 2012 NC Energy Code blower door and duct testing.
- Blower door testing, or visual inspection, & Duct Blaster testing
- Data collected entered into REM/Rate software to produce “Confirmed Rating”.



Above & beyond Energy
910.398.7301 www.ABNRGY.com

I-Rate - Input Checklist
Input in Rem & Irate By

ENERGY STAR PARTNER

Builder:
House Address:
City: State: Zip Code:
Community:
Model #:
Utilities: Gas / Pro Electric

DATE:
Time in House: Time Out:
Super: Phone:
Rater: Outdoor Temp:
Insulation Contractor:
HVAC Contractor:

Bedrooms: Stories: Home S.F.
Dryer: ☐ Gas ☐ Electric Range: ☐ Gas ☐ Electric ☐ Propane
RIMs: I-Type/R: Thickness:
Foundation: Cond ☐ Sealed ☐ Vented ☐ Open ☐ Slab N/A ☐
Wall I-Type/R: Wall Height: Floor I-Type / R-:
Vapor Barrier: Installed ☐ Sealed ☐ None ☐ N/A ☐
Exterior Walls Color: Light ☐ Medium ☐ Dark ☐ S/R ☐
2x4 / 2x6: I-Type/R- F-Sheathing: Y☐ N☐ Type/R:
Frame Floors: SEE ROUGH ☐
Crawl I-type R- Cant I-type R- Gar Ceil I-type R-
Party Walls: N/A ☐
Wall: I-Type/R- F / R / B / L
Attics/ceilings Roof Color: Attic Ins Grade: 1 2 3
Flat Attic 1: ☐ Vault 1 ☐
Flat Attic 2: ☐ Vault 2: ☐
Rafter Insulation: ☐ Radiant Barrier Y ☐ N ☐
Ceiling Heights: 1st 2nd 3rd Other
Knee Walls: SEE ROUGH: ☐
I-Type / R-: Sheathing: Y☐ N☐ Type/R:
Garage Attached: Y ☐ N ☐ Location: L / R / B / F Bays
Common Wall: I-Type/R-:
Front Faces:

HVAC#1: Location: Zones:
Brand: Fuel: E ☐ G ☐ P ☐
Coil M#: KW Heatstrips:
Condenser M#: SEER HSPF
Furnace M#: AFUE:
# of Returns Duct R-Val S R % CS
PTSTAT: Y ☐ N ☐ Circulation Feature: Y ☐ N ☐
Leakage to Outside: cfm % Total: cfm %

HVAC#2: Location: Zones:
Brand: Fuel: E ☐ G ☐ P ☐
Coil M#: KW Heatstrips:
Condenser M#: SEER HSPF
Furnace M#: AFUE:
# of Returns Duct R-Val S R % CS
PTSTAT: Y ☐ N ☐ Circulation Feature: Y ☐ N ☐
Leakage to Outside: cfm % Total: cfm %

HVAC#3: Location: Zones:
Brand: Fuel: E ☐ G ☐ P ☐
Coil M#: KW Heatstrips:
Condenser M#: SEER HSPF
Furnace M#: AFUE:
# of Returns Duct R-Val S R % CS
PTSTAT: Y ☐ N ☐ Circulation Feature: Y ☐ N ☐
Leakage to Outside: cfm % Total: cfm %

Total Leakage to Out: cfm % Total cfm %

Ceiling Joist Spacing ☐ 16"oc ☐ 19"oc ☐ 24"oc size "
Floor Joist Spacing ☐ 16"oc ☐ 19"oc ☐ 24"oc size "
Framed Wall Spacing ☐ 16"oc ☐ 19"oc ☐ 24"oc size "
Advanced Framing ☐ Corners ☐ Headers ☐ Ext/Int Wall

ENERGY STAR ☐ Refrigerator ☐ Washer ☐ DW Brand
☐ Lighting %CFL ☐ Fans DW#
FR Brand FR #

TBC Items	Failed	Passed	N/A	B S/O
Attic Access Air Sealed	☐	☐	☐	☐
Attic Access Insulation Secured	☐	☐	☐	☐
ICAT Cans Gasket to drywall	☐	☐	☐	☐
Misc. Attic Penetrations Air Sealed	☐	☐	☐	☐
Crawl	☐	☐	☐	☐

H2O #1: Brand M#
EF/COP: Fuel: NG P E
BTU: Gallons
H2O #2: Brand M#
EF/COP: Fuel: NG P E
BTU: Gallons

ENERGY STAR Version: ☐ 2.0 ☐ 2.5 ☐ 3.0 ☐ HERS Only

☐☐ Air Leakage: Stack: BD @ CFM 50:
@60 @52 @46 @38 @30 @22

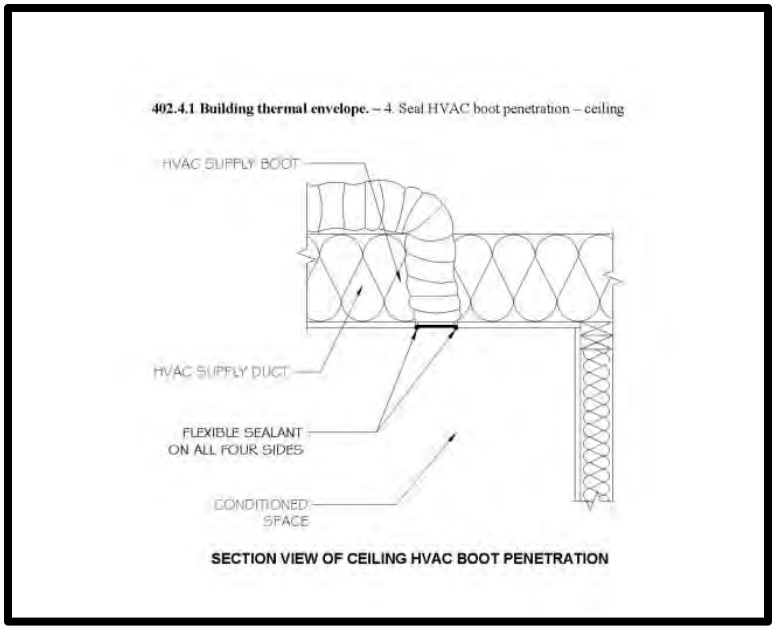
Final Notes & Action Items!
Builder Sign Off: ☐ Verbal Builder Sign Off: ☐
Builder's Name: Date/Spoken to:
Builder Sign Off Items:

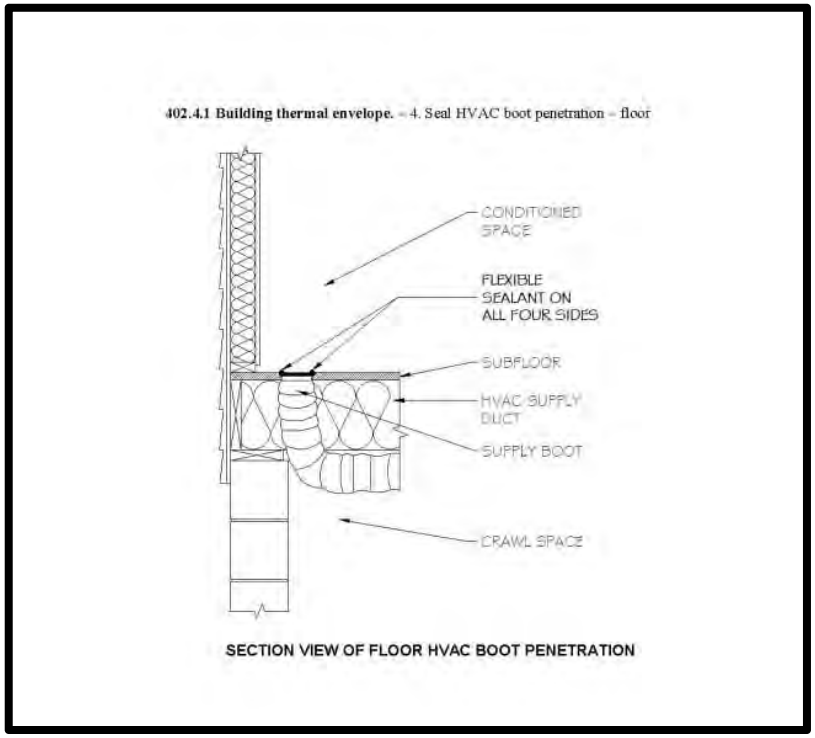
Blower Door

Duct Blaster

Final Inspection
Air Barriers & Air Sealing

- **HVAC Boots** caulked to drywall.
- **Ceiling Light** fixture boxes sealed to sheetrock.
- **ICAT** recessed lighting sealed to sheetrock.
- **Exhaust Fan** boxes sealed to sheetrock.
- **Scuttle Access** gasket in place and insulation attached to panel.
- **Drop Down Attic Stairs** have weather-strip and R-5 Continuous.
- **Weather-stripping** installed exterior doors and attic doors.

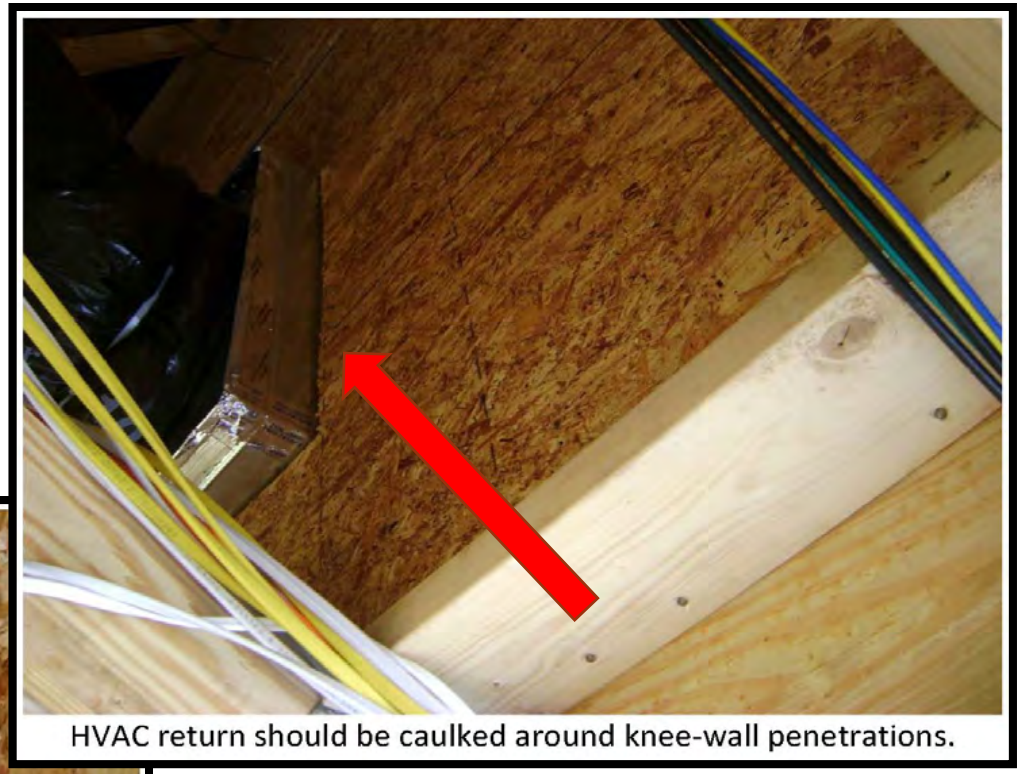




HVAC
Supply & Return

- **Needed:**

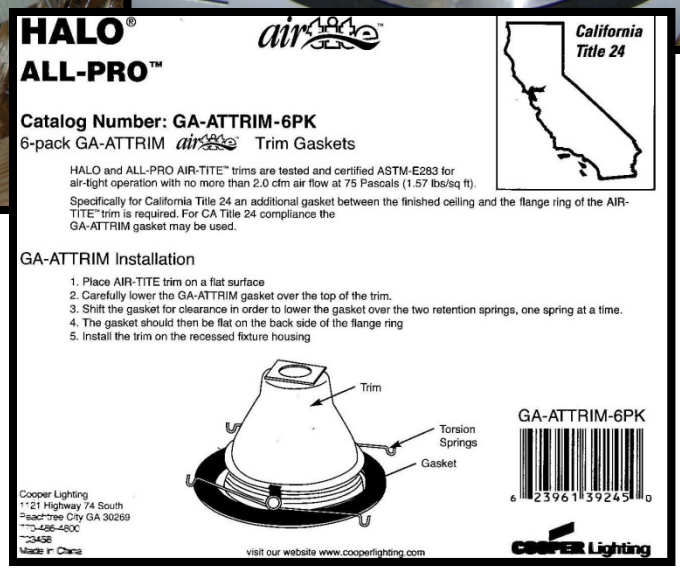
  Air Sealing



HVAC return should be caulked around knee-wall penetrations.

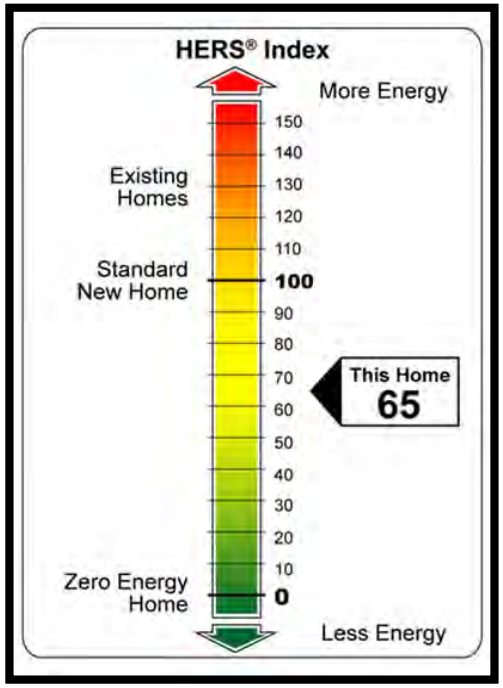
Return duct completely sealed using a paint on mastic product.
Return boot sealed with foam at wall penetration.

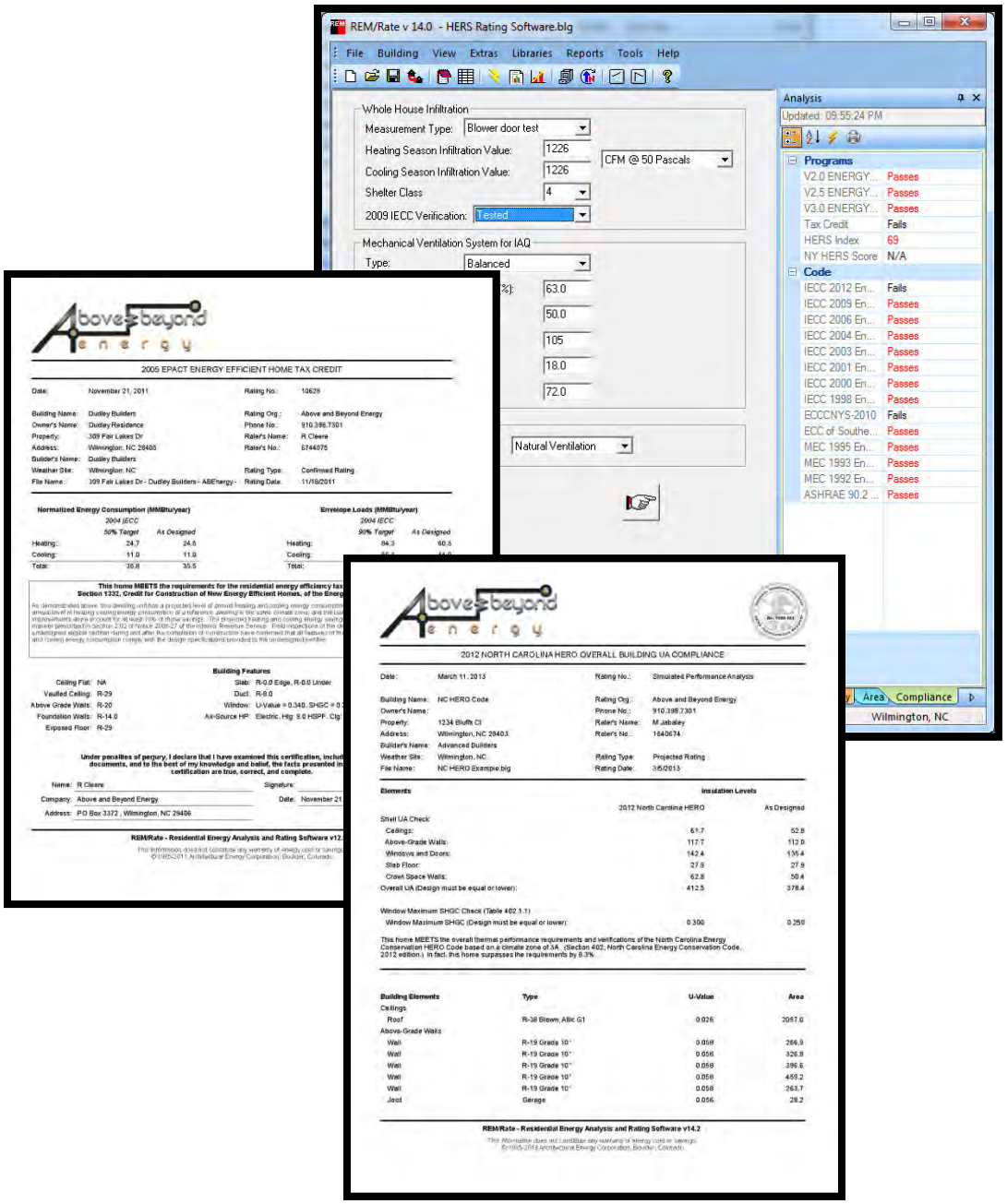
ICAT Can Lights



Benefits of HERS Ratings

- Marketing Opportunities
- Energy-efficient New Homes Tax Credit for Home Builders: $2,000
- ENERGY STAR & Green Building Programs





Compliance Reporting:

- Energy code compliance
- Program compliance
  - ENERGY STAR
- Tax credit compliance
- NC HERO code compliance

Compliance:

Energy Efficiency Certificate

- Passing blower door test confirms homes are reasonably tight at 5 ACH or less (4 ACH for HERO)
- Passing duct system test confirms home's HVAC and duct system is reasonably tight at 6% or less (4% for HERO)
- Certificate posted to display compliance in electrical panel

ENERGY EFFICIENCY CERTIFICATE 401.9	
Builder, Permit Holder or Registered Design Professional Print Name: Signature:	
Property Address:	
Date:	
Insulation Rating - List the value covering largest area to all that apply	R-Value
Ceiling/roof:	R-
Wall:	R-
Floor:	R-
Closed Crawl Space Wall:	R-
Closed Crawl Space Floor:	R-
Slab:	R-
Basement Wall:	R-
Fenestration:	
U-Factor	
Solar Heat Gain Coefficient(SHGC)	
Building Air Leakage	
☐ Visually inspected according to 402.4.2.1 OR	
☐ Building Air Leakage Test Results (Sec. 402.4.2.2) ACH50 [Target: 5.0] or CFM50/SFSA [Target: 0.30]	
Name of Tester / Company: Date: Phone:	
Ducts:	
Insulation	R-
Total Duct Leakage Test Result (Sect. 403.2.2) (CFM25 Total/100SF) [Target: 6]	
Name of Tester or Company: Date: Phone:	
Certificate to be displayed permanently	

Compliance Reports:

ENERGY STAR and HERC

- Confirmed Rating produces ENERGY STAR Certificate
- Confirmed Rating produces Home Energy Rating Certificate
- Heating and Cooling Costs estimated
- Energy and dollar savings quantified
- Green house gas emissions reduction quantified

ENERGY STAR

An ENERGY STAR® Version 2.5 Qualified Home

This home built at

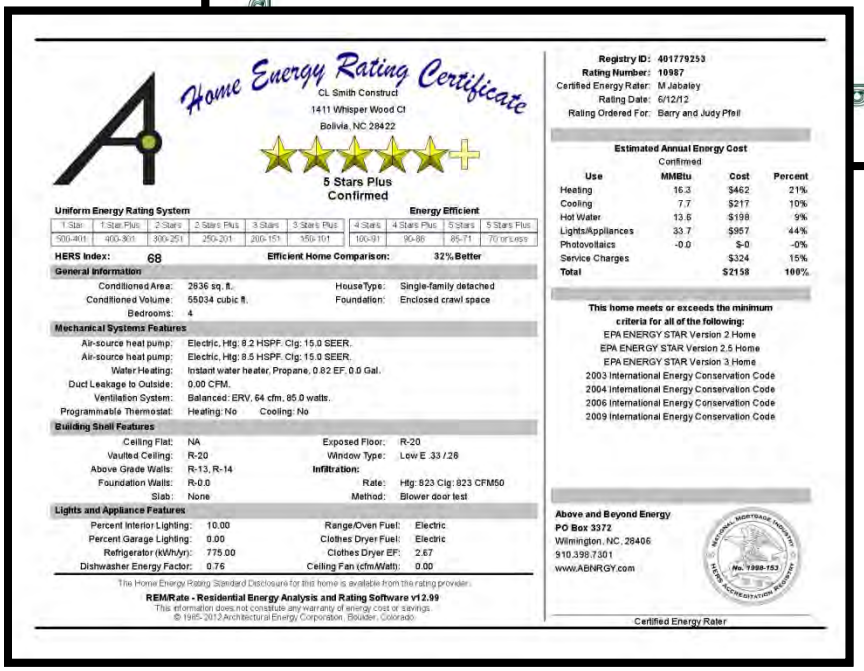
1411 Whisper Wood Ct, Bolivia, NC 28422

by CL Smith Construction

has been verified by Above and Beyond Energy, an independent professional or organization, to meet or exceed strict energy efficiency guidelines set by the U.S. Environmental Protection Agency.

HERS Index: 68

6/12/12



Home Energy Rating Certificate

CL Smith Construct
1411 Whisper Wood Ct
Bolivia, NC 28422

5 Stars Plus
Confirmed

Uniform Energy Rating System — Energy Efficient

1 Star	1 Star Plus	2 Stars	2 Stars Plus	3 Stars	3 Stars Plus	4 Stars	4 Stars Plus	5 Stars	5 Stars Plus
500-401	400-301	300-251	250-201	200-151	150-101	100-91	90-86	85-71	70 or Less

HERS Index: 68 — Efficient Home Comparison: 32% Better

General Information

Conditioned Area:	2836 sq. ft.	House Type:	Single-family detached
Conditioned Volume:	55034 cubic ft.	Foundation:	Enclosed crawl space
Bedrooms:	4		

Mechanical Systems Features

Air-source heat pump:	Electric, Htg: 8.2 HSPF, Clg: 15.0 SEER.
Air-source heat pump:	Electric, Htg: 8.5 HSPF, Clg: 15.0 SEER.
Water Heating:	Instant water heater, Propane, 0.82 EF, 0.0 Gal.
Duct Leakage to Outside:	0.00 CFM.
Ventilation System:	Balanced: ERV, 64 cfm, 85.0 watts.
Programmable Thermostat:	Heating: No Cooling: No

Building Shell Features

Ceiling Flat:	NA	Exposed Floor:	R-20
Vaulted Ceiling:	R-20	Window Type:	Low E .33 /.26
Above Grade Walls:	R-13, R-14	Infiltration:	
Foundation Walls:	R-0.0	Rate:	Htg: 823 Clg: 823 CFM50
Slab:	None	Method:	Blower door test

Lights and Appliance Features

Percent Interior Lighting:	10.00	Range/Oven Fuel:	Electric
Percent Garage Lighting:	0.00	Clothes Dryer Fuel:	Electric
Refrigerator (kWh/yr):	775.00	Clothes Dryer EF:	2.67
Dishwasher Energy Factor:	0.76	Ceiling Fan (cfm/Watt):	0.00

The Home Energy Rating Standard Disclosure for this home is available from this rating provider.

REM/Rate - Residential Energy Analysis and Rating Software v12.99

This information does not constitute any warranty of energy cost or savings.

© 1985-2012 Architectural Energy Corporation, Boulder, Colorado

Registry ID: 401779253
Rating Number: 10987
Certified Energy Rater: M Jabaley
Rating Date: 6/12/12
Rating Ordered For: Barry and Judy Pfeil

Estimated Annual Energy Cost — Confirmed

Use	MMBtu	Cost	Percent
Heating	16.3	$462	21%
Cooling	7.7	$217	10%
Hot Water	13.6	$198	9%
Lights/Appliances	33.7	$957	44%
Photovoltaics	-0.0	$-0	-0%
Service Charges		$324	15%
Total		$2158	100%

This home meets or exceeds the minimum criteria for all of the following:

EPA ENERGY STAR Version 2 Home
EPA ENERGY STAR Version 2.5 Home
EPA ENERGY STAR Version 3 Home
2003 International Energy Conservation Code
2004 International Energy Conservation Code
2006 International Energy Conservation Code
2009 International Energy Conservation Code

Above and Beyond Energy
PO Box 3372
Wilmington, NC, 28406
910.398.7301
www.ABNRGY.com

No. 7998-153

Certified Energy Rater

Energy Efficient Mortgages

New Homes

Also known as an EEM, they aid in the process of qualifying a borrow for a loan to purchase homes that have been rated energy-efficient. An EEM is easily explained by realizing that the person will have more disposable income and can afford a larger house payment.

Energy Improvement Mortgages

Existing Homes

Also known as an EIM, allows for purchaser to borrow additional money for energy efficiency improvements that will be wrapped into mortgage.

Benefits

- The savings are added income, improving debt-to-income ratio.
- A rating shows the value of the added energy-efficient features by estimating monthly savings.
- The home's value is increased from the energy-efficient features.
- May have reduced loan fees.

NC HERO Code and HERS Ratings

APPENDIX 4 ADDITIONAL VOLUNTARY CRITERIA FOR INCREASING ENERGY EFFICIENCY (High Efficiency Residential Option)

1. **Introduction.** The increased energy efficiency measures identified in this appendix are strictly voluntary at the option of the permit holder and have been evaluated to be the most cost effective measures for achieving an additional 15-20% energy efficiency beyond the code minimums.

2. Requirements: Follow all sections of the Chapter 4 of the North Carolina Energy Conservation Code, except the following.
   a. Instead of using Table 402.1 in Section 402.1, use Table E-5A shown below.

TABLE 4A
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR[b]	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC[b, e]	CEILING R-VALUE[k]	WOOD FRAME WALL R-VALUE[e]	MASS WALL R-VALUE[i]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE	CRAWL SPACE[c] WALL R-VALUE
3	0.32[j]	0.65	0.25	38	19, 13+5, or 15+3[eh]	5/10	19	10/13[f]	5	10/13
4	0.32	0.60	0.25	38	19, 13+5, or 15+3[eh]	5/10	19	10/13	10	10/13
5	0.32	0.60	(NR)	38	19, 13+5, or 15+3[eh]	13/17	30[g]	10/13	10	15/19

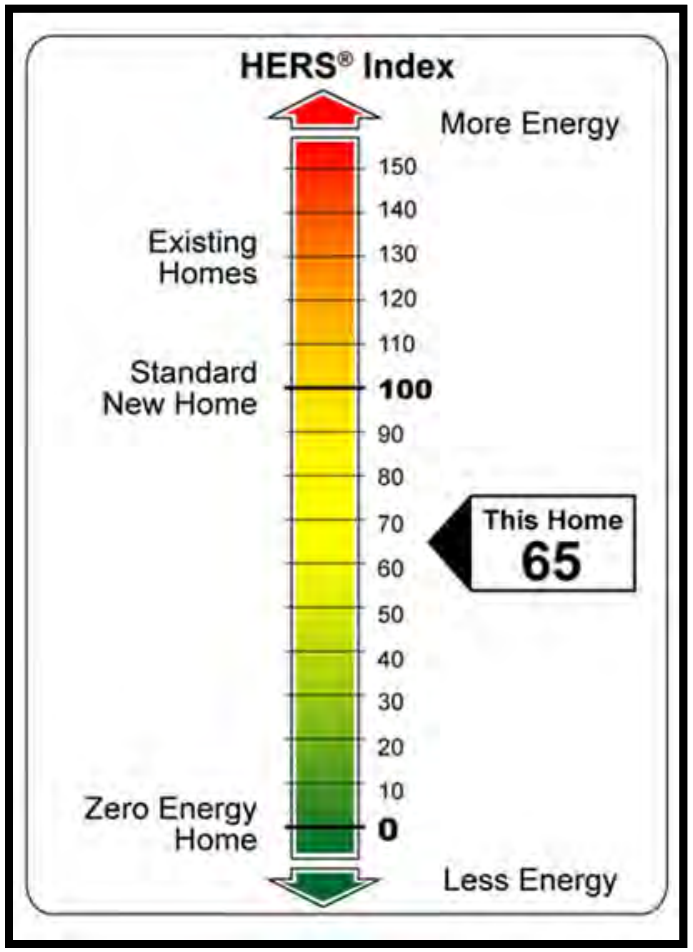
Slab Edge Insulation

Slab Edge Insulation

2x6, R3, SIS, Other?

NC HERO Code and the HERS Index

- HERS Index is pointed towards the 2006 IECC
- 2012 NC code is based on the 2009 IECC which is roughly 15% more efficient than the 2006 IECC
- HERO code is designed to be roughly 30% more efficient than 2006 or 15% more efficient than our current code
- Thus home built to HERO code should have HERS index of 70
- The lower the score, higher the rebate incentive.



Above beyond energy

Questions?