“What You Really Need To Know... About the Alabama Energy Code”

Alabama Residential Energy Code Training

Institute for Building Technology and Safety (IBTS)
Welcome and Introductions

- Name
- Organization/company
- How long have you been in the design, construction, contractor or enforcement industry?
AL Field Study Results

KEY ITEMS MEETING AL ENERGY CODE

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Envelope Tightness</td>
<td>92%</td>
<td>54%</td>
</tr>
<tr>
<td>Duct Tightness</td>
<td>82%</td>
<td>5%</td>
</tr>
<tr>
<td>High Efficacy Lighting</td>
<td>35%</td>
<td>20%</td>
</tr>
<tr>
<td>Ceiling R-Value</td>
<td>95% 95%</td>
<td>98% 98%</td>
</tr>
<tr>
<td>Wall R-Value</td>
<td>100% 100%</td>
<td>100% 100%</td>
</tr>
<tr>
<td>Window U-Value</td>
<td>92% 92%</td>
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<tr>
<td>Window SHGC</td>
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Key Item Observations During Residential Field Study
Why Energy Efficiency?

Fewer Call Backs!
Consumers Expect Efficiency...

- **89%** of consumers in Alabama’s region want to know the home’s energy operating costs before they buy.
- **87%** believe that disclosure of energy use allows them to make informed decisions.
- **54%** of people who pay $300+ on energy bills make less than $60K.
Why Energy Efficiency?

- Homeowners want comfort
- Homeowners want quality
- Homeowners want to spend less on energy

Average U.S. Homeowner Costs 2007-2008

- Energy: $2,340 (46%)
- Property Tax: $1,897 (37%)
- Homeowners Insurance: $822 (16%)
Comfort and Cost
Three Major Changes to AL Energy Code

Envelope Tightness
• 2009 code: 7 ACH50
• 2015 code: 5 ACH50

Duct Tightness
• 2009 code: 12 cfm/100ft²
• 2015 code: 4 cfm/100ft²

High Efficacy Lighting
• 2009 code: 50%
• 2015 code: 75%

Updated AL Residential Energy Code effective: October 1, 2016
How to Comply?

Know your building thermal envelope!
Duct Tightness: How to Comply?

Air handler and all ducts inside building thermal envelope.

No leakage test required.
Duct Tightness: How to Comply?

- All ducts, air handlers and filter boxes shall be sealed
- Building framing cavities shall not be used as ducts or plenums
- Conduct duct leakage test showing less than 4 cfm/100ft\(^2\)

Ducts outside building thermal envelope.

Test at final or rough-in.
Duct Tightness Testing

Duct Tightness Thresholds:

• At rough-in stage with - no air handler installed
  – Max 4 cfm per 100 s.f. - Total Leakage

• Testing at rough-in stage w/ air handler
  – Maximum 4 cfm per 100 s.f. -
    Total Leakage (RIT Rough-In Total Leakage)

• When testing at final (Post Construction)
  – Maximum 4 cfm per 100 s.f. –
    “Total Leakage” (PCT Post-Construction Total Leakage)
Duct Leakage: Building Pressure Issues
Duct Leakage: Building Pressure Issues

- Return Side Leakage
- Air Handling Unit
- Supply Air
- Duct Leakage pulls unconditioned air into the system
- Return Air
- Pressurization
- More supply air than return air
- Air & Moisture Exfiltration

2012 Institute for Building Technology and Safety
Duct Leakage: Building Pressure Issues

Balanced System

Air Handling Unit

Supply Air Duct

Return Air Duct

Balanced Pressure
Duct Sealing

Remember This Place...??
Duct Sealing: Details

- Mesh tape and mastic
- Mastic at swivel joints
- Ceiling register
- Caulk between drywall and boot
- Supply leakage
- Supply air
- Supply leakage
Duct Sealing: Details
Duct Sealing: Details

INCORRECT: No Sealant

CORRECT: Mastic-sealed Joints
Duct Sealing: Details

- Seal all cracks and penetrations
- Apply mastic to all seams
- Install insulation for complete coverage
Duct Sealing: Details
Don’t use conventional duck tape!
Requirements for Duct Tightness testing in Alabama

If you are:
Licensed Home Builder or HVAC Contractor

- Must have one of the following certifications:
  - HERS
  - BPI Building Analyst
  - QCATV (Qualified Credentialed Air Tightness Verifier) /(DET)
- Proof of certification and Registered with the Home Builders Association ($125)
- Completion of DATT (Duct Air Tightness Testing) through the HVAC board ($50 renewed annually)
- Must be current and up to date with CEU requirements

If you are not a Licensed Contractor

- Must have one of the following certifications:
  - HERS
  - BPI Building Analyst
  - DATT licensed and registered with HBAA(can not perform third party)
Duct Testing Video
Alabama Duct Inspection Certification Form

Business Name: [Blank]

HVAC Certification No.:

Contractor Name: [Blank]

DET Certification No.:

City: [Blank]  State: [Blank]  Zip: [Blank]

Permit No.:

Date:

Home Owner: [Blank]  o  Pass
Street Address: [Blank]
City: [Blank]  o  Fail
Zip Code: [Blank]
Contractor Name: [Blank]

DUCT INSPECTION QUESTIONNAIRE

All duct work joints and seams have been sealed using mastic or code approved equivalent (IBC M1501.4.1/IECC 403.2.2)
Ducts and air handler are located within conditioned space – No Testing Required (IECC 403.2.3 – Exceptions)
System was tested (See Results Below)

DET Verification Test Conducted By: [Blank]  Date Conducted: [Blank]

Tool used to conduct the duct tightness test: Duct Pressure (DP), Blower Door Subtraction (BDS): (NOTE: ALABAMA HACR BOARD REQUIRES DUCT PRESSURE TEST)

Unless all ducts are located within conditioned space, contractor must verify one of the following:
- Post Construction duct leakage to outdoors (PCO) is ≤ 8%
- Post Construction total duct leakage (PCD) is ≤ 12%
- Rough in total leakage (ET) with air handler installed is ≤ 6%
- Rough in total leakage without air handler installed (ET/NA) is ≤ 4%

% Duct Leakage Result = CFM/100/Conditioned Floor Area Served

System  Tool (DP, BDS)  Test  CFM/100  Area Served Sq Ft  Result %

I certify that I have inspected the duct work associated with the HVAC unit referenced by the permit listed above (if applicable and where required) and found it complies with the requirements of chapter 308-3-4 of the Administrative Code of Alabama, known as the Alabama Energy and Residential Code.

DET Contractor Signature: ______________  Date: ______________

*Note: This document to be provided to homeowner, building official and the HACR Board.
Envelope Tightness: Why is it important?

- Energy penalty due to infiltration/exfiltration
- Comfort! Due to drafts.
- Indoor Air Quality
- Moisture transport through airflow
Envelope Tightness

Know your building thermal envelope!
# Envelope Tightness: How to comply?

## Know where to air seal: Code Criteria (Table R402.4.1.1)

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>AIR BARRIER CRITERIA</th>
<th>INSULATION INSTALLATION CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General requirements</strong></td>
<td>A continuous air barrier shall be installed in the building envelope.</td>
<td>Air-permeable insulation shall not be used as a sealing material.</td>
</tr>
<tr>
<td></td>
<td>The exterior thermal envelope contains a continuous air barrier.</td>
<td></td>
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<tr>
<td></td>
<td>Breaks or joints in the air barrier shall be sealed.</td>
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</tr>
<tr>
<td><strong>Ceiling/attic</strong></td>
<td>The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed.</td>
<td>The insulation in any dropped ceiling/soffit shall be aligned with the air barrier.</td>
</tr>
<tr>
<td></td>
<td>Access openings, drop down stairs or knee wall doors to unconditioned attic spaces shall be sealed.</td>
<td></td>
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<tr>
<td><strong>Walls</strong></td>
<td>The junction of the foundation and sill plate shall be sealed.</td>
<td>Cavities within corners and headers of frame walls shall be insulated by completely filling the</td>
</tr>
<tr>
<td></td>
<td>The junction of the top plate and the top of exterior walls shall be sealed.</td>
<td>cavity with a material having a thermal resistance of R-3 per inch minimum.</td>
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<td></td>
<td>Knee walls shall be sealed.</td>
<td>Exterior thermal envelope insulation for framed walls shall be installed in substantial contact</td>
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<tr>
<td></td>
<td></td>
<td>and continuous alignment with the air barrier.</td>
</tr>
<tr>
<td><strong>Windows, skylights and</strong></td>
<td>The space between window/door jambs and framing, and skylights and framing shall be sealed.</td>
<td></td>
</tr>
<tr>
<td>doors**</td>
<td></td>
<td>Rim joists shall be insulated.</td>
</tr>
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<td><strong>Rim joists</strong></td>
<td>Rim joists shall include the air barrier.</td>
<td>Floor framing cavity insulation shall be installed to maintain permanent contact with the</td>
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<tr>
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<td></td>
<td>underside of subfloor decking, or floor framing cavity insulation shall be permitted to be in</td>
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<tr>
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<td></td>
<td>contact with the top side of sheathing, or continuous insulation installed on the underside</td>
</tr>
<tr>
<td></td>
<td></td>
<td>of floor framing and extends from the bottom to the top of all.</td>
</tr>
<tr>
<td><strong>Floors (including above</strong></td>
<td>The air barrier shall be installed at any exposed edge of insulation.</td>
<td></td>
</tr>
<tr>
<td><strong>garage and cantilevered</strong></td>
<td></td>
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<td><strong>floors</strong></td>
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Envelope Tightness: How to comply?
Seal around tubs and plumbing penetrations
Recessed Lighting: How to Comply?

Recessed Lighting Fixture Diagram

INCORRECT: Standard Fixture

CORRECT: IC-Rated and Air-Tight

Source: DOE
Seal gaps and rim joists
Use backer rod or low expanding spray foam (appropriate for windows) to fill gaps between window/door and rough opening.
Air Seal Top and Bottom Plates

- Apply caulk to drywall around top and bottom plates.
- Caulk bottom plate to subfloor and plates.
- Caulk drywell to top plate (recommended).
- Tape or caulk exterior sheathing seams.
- Caulk drywell to bottom plate. Caulk bottom plate to subfloor, foundation, or slab.
- Install exterior water resistive barrier.
- Sill gasket or termite flashing under sill plate as capillary break.
Seal Gaps and Cracks

Seal anywhere you can see light coming in!
Seal All Penetrations in Envelope
Seal Chases, Mechanical Penetrations
Envelope Leakage Testing

- All homes must be tested
- Section R402.4
- Performance testing of house leakage
  - Blower door result must be less than 5 ACH50 (after Oct. 2016)
- Additions, Substantial Renovations NOT included in that requirement
Envelope Leakage Test Video?
Insulation Installation

Proper Installation of Insulation is critical to achieving the intended thermal performance of the product.
Floor Insulation

Staves cut from rigid board insulation can rest on lip of I-beam and support insulation.

Tiger claws support insulation – engineered I-beams require a longer “claw”.
Wall Insulation
Basement Wall Insulation

- Stud wall with batts
- 1x2 framing strips with 2 layers of foam sheathing
- Water-resistant, fire-rated foam sheathing affixed with adhesive to concrete wall and seams sealed with tape
- No drywall required

Drywall to meet fire code
Spray Foam on the Roofline

Sprayed Polyurethane Foam (SPF) applied at a minimum of R-20 (U-0.05) is acceptable as a prescriptive trade-off.

This is covered in section R402.2.2.1 (N1102.2.2.1) (Semi-conditioned attics) of the new AL code.

This reduction in the prescriptive R-value is allowed without running a REScheck report.
75% High-Efficiency Lighting

Not less than 75 percent of the lamps in permanently installed lighting fixtures at the time of inspection shall be high-efficacy lamps or not less than 75 percent of the permanently installed lighting fixtures shall contain only high efficacy lamps.

High efficacy lamps:
1. 60 lumens/watt for lamps over 40 watts
2. 50 lumens/watt for lamps 15-40 watts
Energy Cost Savings

One traditional incandescent bulb uses as much energy as 6-1/2 LED’s!
# Low Maintenance

<table>
<thead>
<tr>
<th>HOW OFTEN WILL THIS BULB NEED TO BE REPLACED?</th>
<th>TRADITIONAL INCANDESCENT</th>
<th>HALOGEN INCANDESCENT</th>
<th>COMPACT FLUORESCENT (CFL)</th>
<th>LIGHT EMITTING DIODE (LED)</th>
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<tr>
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<td>15-20 YEARS</td>
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| ELECTRICITY CONSUMPTION (WATTS) | 60 | 42 | 13 | 9  |

| AVERAGE ANNUAL COSTSAVINGS     | N/A | $2.17 | $5.66 | $6.15 |

*Assumes 3 hours use per day at $0.11 per kWh
Free Marketing Brochure

DESIGNING HOMES TO SHINE A LIGHT ON SAVINGS

Buying a home is one of the biggest purchases you will ever make, and you deserve a high-quality home that’s worthy of your investment and built to last. One of the ways you can protect your investment—and save money on your monthly bills—is by purchasing a home with energy-efficient lighting. Today’s lighting technologies such as compact fluorescents (CFLs) and light-emitting diodes (LEDs) allow homeowners to relax in the soft, warm glow of a well-lit home year after year. Using less energy to provide a higher quality of light than older bulbs, today’s long-lasting technologies not only save homeowners money on their monthly energy bills, they also reduce the headache of battling burn out: One of today’s efficient light bulbs can last 15-20 years.

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Add logo and company information.
Stay updated on field study

www.alenergycode.org

Sign-up for updates and notification of training dates.
QUESTIONS?