

# 2009/2012 International Energy Conservation Code(IECC)

## A NJ Energy Subcode Update Central Jersey Code Officials Association

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# MaGrann Associates

- ▶ Residential energy engineers and consultants for more than 25 years
  - 50 employees
  - Based in Mount Laurel, NJ
  - Offices in Philadelphia, Columbus and Louisville
- ▶ An accredited HERS Rating/Training Provider and rating company
  - ENERGY STAR® for Homes
  - LEED for Homes
  - NAHB Green Building Standard
- ▶ *And* a utility program administrator
  - Over 50,000 ENERGY STAR homes certified
- ▶ Recognized for program design and achievement
  - RESNET Leadership in Market Transformation Award (E.ON U.S.)
  - ENERGY STAR Partner of the Year

# 2009 IECC in NJ – so far

## Our Observations...

- ▶ Implementation has been limited – so far
  - The economy
  - Permit extensions
  - Delayed implementation of duct testing
  - Use of NJ ENERGY STAR Homes as compliance path
- ▶ Questions remain about implementation of duct testing
  - How will 1.1.13 date be applied?
  - Who will do the testing?

Your Thoughts...?

# 2009 IECC Review

## Most Significant Changes

- ▶ Section 402.4 Air Leakage (Mandatory)
  - Detailed air sealing requirements (Table 402.4.2)
  - Verification by air leakage testing or visual inspection
  - “Where required by the *code official*, an *approved* third party independent from the installer of the insulation shall inspect the air barrier and insulation.”
  - Does not specify who can conduct blower door testing
  - Total leakage  $\leq 7$  Air Changes per Hour at 50 Pascals

# 2009 IECC Review

**TABLE 402.4.2  
AIR BARRIER AND INSULATION INSPECTION COMPONENT CRITERIA**

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



# 2009 IECC Review

- ▶ Section 403.2.2 Duct Leakage (Mandatory)
  - All ducts, air handlers, filter boxes and building cavities used as ducts shall be sealed. Joints and seams shall confirm with Section M1601.4.1 of the IRC).
  - Duct tightness verified by a duct leakage test
    - Post construction - leakage to outdoors  $\leq 8$  cfm/100 sf of CFA *OR* total leakage of  $\leq 12$  cfm/100 sf of CFA at 25 Pascals
    - Rough-in total leakage of  $\leq 6$  cfm/100 sf of CFA (w/AH) *OR* total leakage of  $\leq 4$  cfm/100 sf of CFA (w/out AH) at 25 Pascals
  - Testing not required if air handler and all ducts are within *conditioned space*

# NJ DCA Bulletin 11-1

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BULLETIN

*Note: COMcheck is the software most commonly used to demonstrate compliance with the energy subcode. However, the US Department of Energy does list other building energy software tools that can be used in lieu of COMcheck as long as the tool chosen determines compliance with the provisions of the 2007 ASHRAE Standard 90.1, specifically the building envelope, lighting, HVAC, and service water heating requirements. These tools can be found at [http://apps1.eere.energy.gov/buildings/tools\\_directory/](http://apps1.eere.energy.gov/buildings/tools_directory/) by clicking on the "Codes and Standards;" link under the "Tools by Subject" heading on the left-hand side of the webpage.*

Regardless of the compliance method chosen, the documentation must be signed and sealed by a design professional, except that in Class 3 buildings as described at N.J.A.C. 5:23-4.3A(d), the documentation may be signed by the mechanical contractor.

#### INSPECTION

Work done in **low-rise residential buildings** is inspected to verify:

- (1) The insulation specified on the plans is the insulation installed,
- (2) The sealing (air tightness) of the building thermal envelope (this may be done through either a visual inspection or a blower door test), and
- (3) Effective January 1, 2013, duct tightness through an air leakage test.

*A further explanation of these inspection responsibilities follows.*

**Insulation** — N.J.A.C. 5:23-2.18(b)1iv(1)(C) requires inspectors to verify that the insulation levels installed match the ones: (a) used in the calculations, (b) found in the REScheck printout, or (c) shown in the Prescriptive Package table. The one exception to inspector verification of the insulation levels is a home enrolled in the NJ Energy Star Homes Program where compliance is verified by a third party. In all cases, other Energy Subcode requirements, such as piping and ductwork insulation, still apply. With specific regard to ductwork, supply ducts in attics are to be insulated to a minimum of R-8 when outside the building thermal envelope, and all other ducts outside the building thermal envelope, to a minimum of R-6.

**Sealing** — Previous editions of the energy subcode were not specific in the requirements for sealing of the building thermal envelope and ductwork. With the adoption of the 2009 IECC, new and specific sealing requirements have been added. To differentiate from the past editions of the Energy Subcode, the word "tightness" is used along with sealing.

- **Building Thermal Envelope tightness** — The permit holder has two options for verifying building thermal envelope tightness: (1) testing per Section 402.4.2.1, or (2) visual inspection per Section 402.4.2.2. Because inspectors are already looking at the type of insulation installed, the visual inspection (option #2) will have already been partially completed; the

# Compliance Approaches – pre 1/1/13

- ▶ Visual air sealing checklist by UCC inspector or 3<sup>rd</sup> party– no testing rqd.
- ▶ Air leakage testing prior to closing. Sample pre-drywall inspections as needed.
- ▶ NJ ENERGY STAR Homes program. Satisfies energy code documentation and testing requirements.



# Compliance Approaches – post 1/1/13

- ▶ Visual air sealing checklist by UCC inspector or 3<sup>rd</sup> party– no testing rqd if ducts and AH are inside.
- ▶ Duct/Air leakage testing prior to closing. Sample pre-drywall inspections as needed.
- ▶ NJ ENERGY STAR Homes program. Satisfies energy code documentation and testing requirements.

# Other IECC Highlights

- ▶ Building envelope insulation requirements are slightly more stringent (approximately 2% in Zone 5 and 5% in Zone 4).
- ▶ Section 402.4.3 – New wood burning fireplaces must have gasketed doors and outdoor combustion air.
- ▶ Section 402.4.5 – Recessed lights in the *building thermal envelope* must be I.C. Airtight rated and must be caulked or gasketed to the finished ceiling.
- ▶ Section 403.1.1 – For a forced air furnace, at least one setback programmable thermostat with a daily schedule is required.
- ▶ Section 403.2.1 – Now prescriptive (not mandatory), supply duct insulation in attic remains at R-8. Minimum insulation for all other ducts in unconditioned space has been reduced to R-6.

# Other IECC Highlights

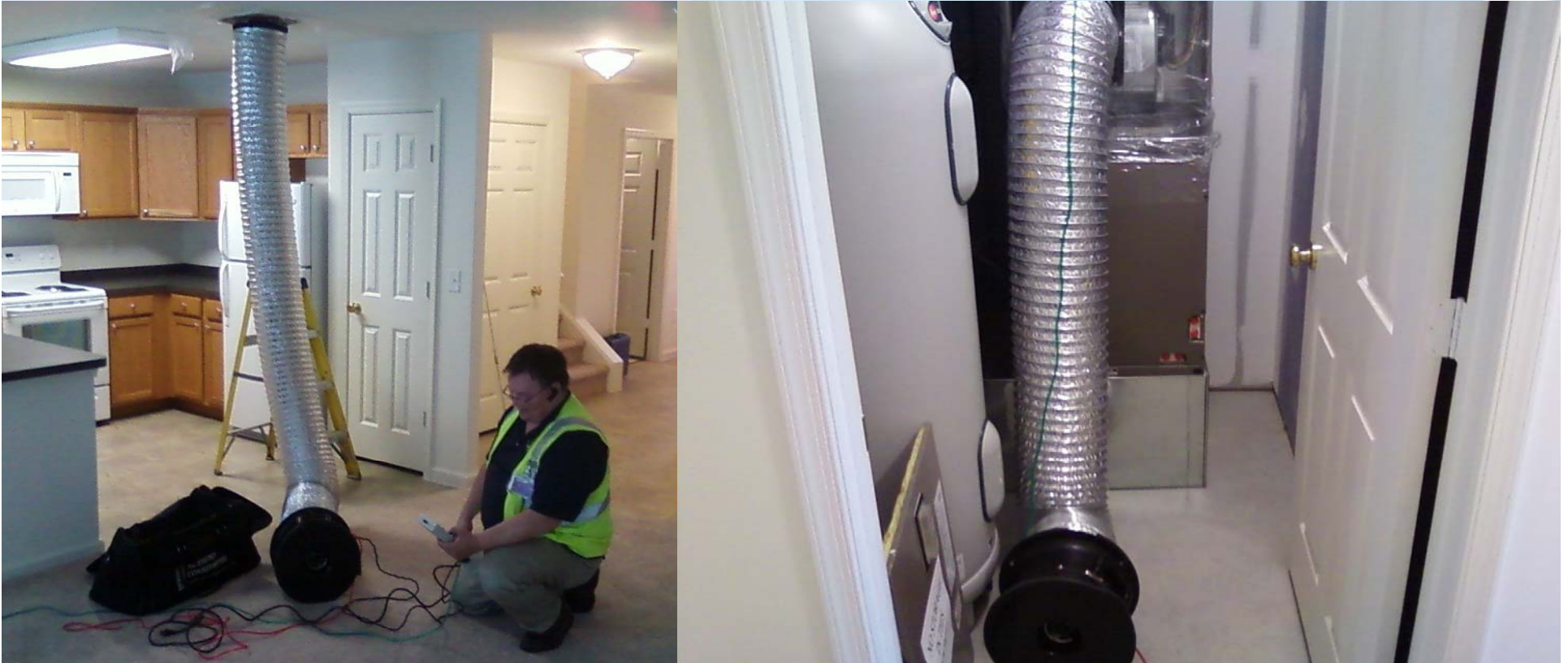
- ▶ Section 403.1.2 – Heat Pumps with electric supplementary heat must have controls that prevent backup heat from operating when the primary system can meet heating requirements.
- ▶ Section 403.5 – Outdoor air intake and exhausts must have automatic or gravity dampers that close when not in use.
- ▶ Heating and cooling equipment must be sized according to IRC Section M1401.3 of the. (Loads calculated using ACCA Manual J or equal and equipment selected using ACCA Manual S).
- ▶ For prescriptive path, a minimum of 50% of lamps in hard wired lighting fixtures must be high-efficacy lamps (T8 or smaller diameter linear fluorescent, CFL's, or appropriate lumen per Watt rating).

# Blower Door Testing



- ▶ Completed at “carpet stage”
- ▶ Windows, doors, fireplace doors closed
- ▶ Access panels in place
- ▶ Dampers closed but not sealed
- ▶ Interior doors open
- ▶ Openings for continuous ventilation sealed
- ▶ HVAC systems off
- ▶ HVAC system not sealed
- ▶ Volume of conditioned space calculated
- ▶ Verify leakage  $\leq 7$  ACH<sub>50</sub>

# Duct Leakage Testing



- ▶ Connect duct leakage tester to air handler blower compartment or large return grille using “duct mask” and/or cardboard templates. About 15% require an attic connection.

# Duct Leakage Testing



- ▶ Seal registers and grilles using “duct mask”
- ▶ Leave the blower door in place for leakage to outside test

# Duct Leakage Testing

- ▶ For duct leakage to outside test, simultaneously pressurize house (with blower door) and ducts (with duct tester) to 25 PA, read leakage and divide by square feet of *conditioned floor area*.
- ▶ For total duct leakage, blower door is not used.
- ▶ Testing at rough stage can help you to eliminate problems before they are covered up, but there are some challenges:
  - Temporary power
  - Duct mask doesn't stick well to oiled sheet metal or plywood
  - Wet basements
  - Tougher standard to meet
  - Two separate tests if air handler is not installed

# 2012 IECC Preview

- ▶ DOE predicts savings of 30% over 2006 IECC (15-18% savings over 2009).
- ▶ Completely separate provisions for residential and commercial.
- ▶ Additional air sealing and mandatory air leakage testing with tougher standard.
- ▶ Duct leakage testing has total leakage standard only – significantly more stringent.
  - Low leakage air handlers required (rated at 2% of design air flow)
  - Building cavity returns not permitted
- ▶ R-3 domestic hot water piping insulation required in many cases – even in conditioned space.
- ▶ A minimum of 75% of lamps in permanently installed lighting fixtures must be high efficacy or 75% of fixtures must contain only high efficacy lamps. (Mandatory)



# 2012 IECC Preview

Performance Standard	ENERGY STAR v2	2009 IECC	ENERGY STAR v3	2012 IECC
Building Envelope Leakage (Air Changes/Hour @ 50 Pa)	no threshold	7	Target only: 5 (Climate Zone 4) 4 (Climate Zone 5)	3
Duct Leakage to Outside (CFM/100 sf of conditioned floor area @ 25 Pa)	6	8	4 (5 for homes ≤ 1200 SF)	N/A
Total Duct Leakage (CFM/100 sf of conditioned floor area @ 25 Pa)	N/A	6 (4 if AH is not installed)	8	4

Notes:

1. Unless otherwise noted, performance thresholds listed are either universally applied or are applicable to Climate Zones 4 and 5, which cover NJ
2. Duct leakage for 2009 IECC must meet one of two standards, duct leakage to outside at finished condition or total duct leakage af rough-in
3. Duct leakage for 2012 IECC changes to only a total duct leakage standard that is 1/2 the rate of the current ENERGY STAR standard.

# 2012 IECC Preview

System	2009 IECC		2012 IECC	
	CZ 4	CZ 5	CZ 4	CZ 5
Window <i>U</i> -Factor	≤0.35	≤0.35	≤0.35	≤0.32
Skylight <i>U</i> -Factor	≤0.6	≤0.6	≤0.55	≤0.55
Window/Skylight SHGC <sup>1</sup>	NR	NR	≤0.40	NR
Ceiling <i>R</i> -Value	38	38	49	49
Wood Frame Wall <i>R</i> -Value <sup>2</sup>	13	20 or 13 + 5	20 or 13 + 5	20 or 13 + 5
Floor <i>R</i> -Value	19	30	19	30
Mass Wall <i>R</i> -Value <sup>3</sup>	5 / 10	13 / 17	8 / 13	13 / 17
Basement Wall <i>R</i> -Value <sup>3</sup>	10 / 13	10 / 13	10 / 13	15 / 19
Slab <i>R</i> -Value, Depth	10, 2 feet	10, 2 feet	10, 2 feet	10, 2 feet
Crawl Space Wall <i>R</i> -Value <sup>3</sup>	10 / 13	10 / 13	10 / 13	15 / 19

## Notes

1. NR means not required
2. R-20 cavity insulation or R-13 cavity insulation plus R-5 continuous insulation
3. Continuous / Cavity Insulation

# Questions



**Thank you for your attention...**

*For more information ...*

***contact***

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