Feature – Zone 3	2006 IECC	2009 IECC
Window U factor	0.65	0.50
Skylight U factor	0.65	0.65
Window SHGC	0.40	0.30
Ceiling R-value	30	30
Wood frame R-value	13	13
Mass wall R-value[1]	5	5/8
Floor R-value	19	19
Basement wall R-value[2]	0	5/13
Slab R-value	0	0
Crawl space wall R-value[2]	5/13	5/13
403.1.1 Programmable Thermostat	No	Yes for forced – air furnace
403.1.2 Heat Pump – adaptive recovery	Yes	Yes
403.2.1 Duct Insulation	R-8 unconditioned space R-6 all others	R-8 unconditioned space R-6 all others (Ducts in conditioned space are exempted)
403.2.2 Duct sealing	"Substantially Tight"	Rough In Test 6 cfm / 100 SF or 4 cfm / 100 SF w/o Air handler Final Test 8 cfm / 100 SF leakage to outside 12 cfm / 100 SF – total leakage
403.3 Piping Insulation	R-2 > 105 degrees	R-3 for fluids > 105 degrees
403.4 Circulation Hot Water Systems	None	R-2
404.1 Lighting equipment	None	50% of bulbs high efficacy
403.6 Equipment Sizing (Man J & D)	Required	Required
402.4.3 Fireplaces	None	Wood Fireplaces with gasketed doors & Fresh Air
402.4.2 Building Thermal Envelope	"Durably Sealed"	Prescriptive inspection or Blower Door testing < 7 ACH

1 – The second R-value applies when more than half the insulation is on the interior of the mass wall.
2 – R-5 required for continuous insulation (Rigid Board) on interior of wall or R-13 required for stud walls with cavity fill

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2009 IECC Requirements

Air Barrier 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

Definition – Air Barrier; Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope. An air barrier may be a single material or combination of materials. *"Fiberglass insulation is NOT an air barrier".*

Typical air barriers;

- Thermo-Ply
- OSB
- Gypsum
- Rigid insulation board
- Some house wraps – properly installed with button head nails and tapped

Definition – Building Thermal Envelope; The basement walls, exterior walls, floor, roof and any other building element that enclose conditioned space.

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2009 IECC Requirements

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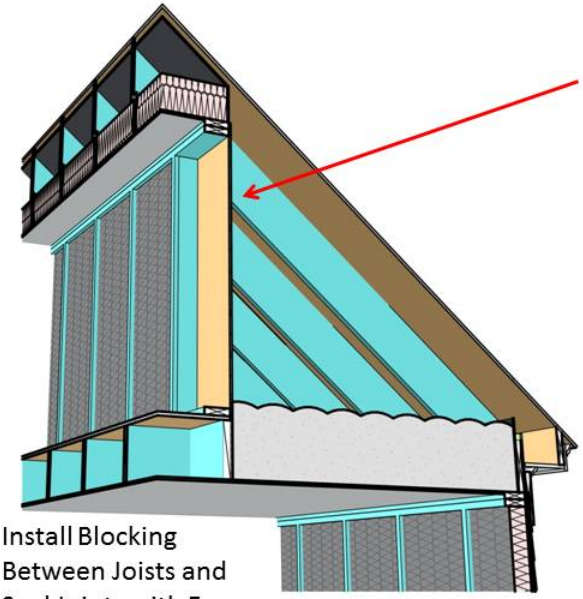

- Install Top and Bottom Plate
- Install Air Barrier Behind Knee Wall
- All Penetrations, Gaps & Cracks Sealed with Foam or Caulk

- Install Blocking Between Joists and Seal Joints with Foam

TIP – Best Practice
Using OSB for knee wall backing not only improves the structural strength of the wall assembly but is also less likely to be damaged during construction

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2009 IECC Requirements

Air Barrier Thermal Barrier

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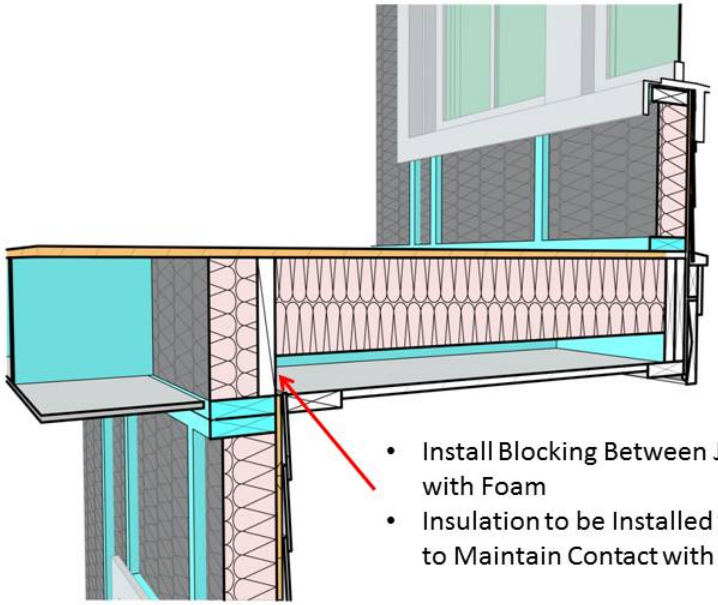

- Install Blocking Between Joists and Seal Joints with Foam
- Insulation to be Installed with Sufficient Supports to Maintain Contact with Subfloor

TIP – Best Practice
Install insulation with sufficient thickness to completely fill framing cavity

Option 1

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2009 IECC Requirements

Air Barrier 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
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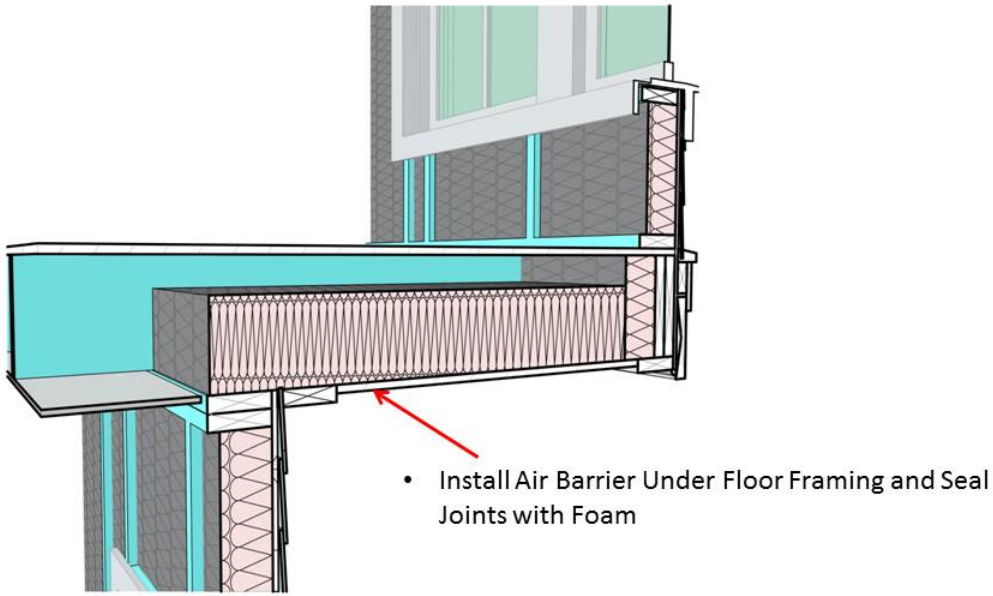

Option 2

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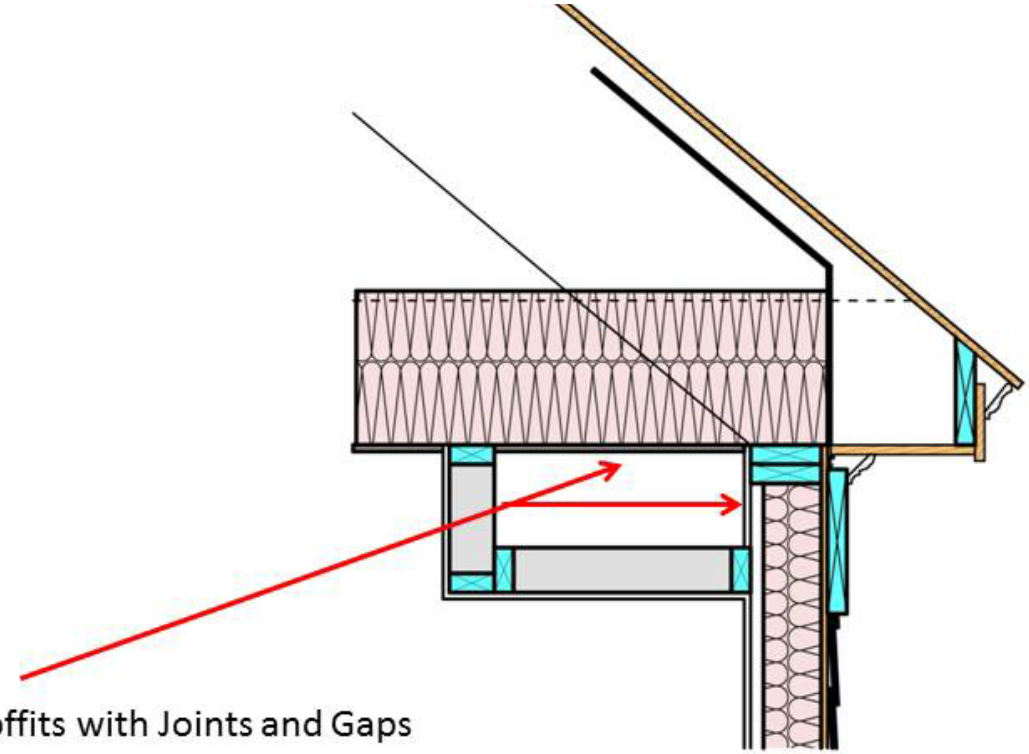
2009 IECC Requirements

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



- Install Blocking at Soffits with Joints and Gaps sealed with Foam

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2009 IECC Requirements

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

Pull down stair with weather stripping and insulation panel

Attic access panel with weather stripping and insulation

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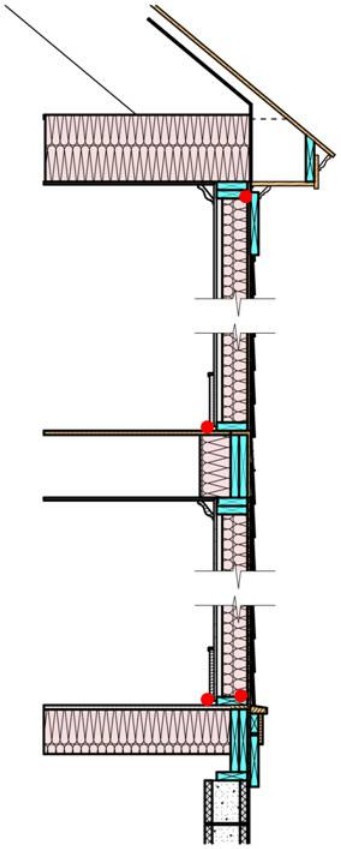
2009 IECC Requirements

Walls

Corners and headers are insulated
Junction of foundation and sill plate is sealed



- Areas to Seal with Foam or Caulk to Achieve Required Air Leakage Target
- All Penetrations Through Exterior Sheathing Sealed with Caulk or Foam
- Any Visible Gaps/Cracks at Sheathing Joints Sealed with Foam or Caulk.
- "Look for Daylight"

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2009 IECC Requirements

Walls

Corners and headers are insulated
Junction of foundation and sill plate is sealed

Two stud corners with insulation installed.

Exception, two stud corners may not meet the structural requirements in high wind or earthquake zones.

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2009 IECC Requirements

Walls

Corners and headers are insulated
Junction of foundation and sill plate is sealed

Install minimum ½” rigid insulation board at headers.

Best practice - Size headers for actual loads. Smaller headers on non-load bearing walls use less wood and allow for more insulation.

Install sill seal between bottom plate and concrete slab foundation or caulk plate to concrete.

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2009 IECC Requirements

Windows And Doors

Space between window / door jambs and framing is sealed

Seal gap between window or door frame with;

- Caulk
- Low expansion foam
- Backer Rod

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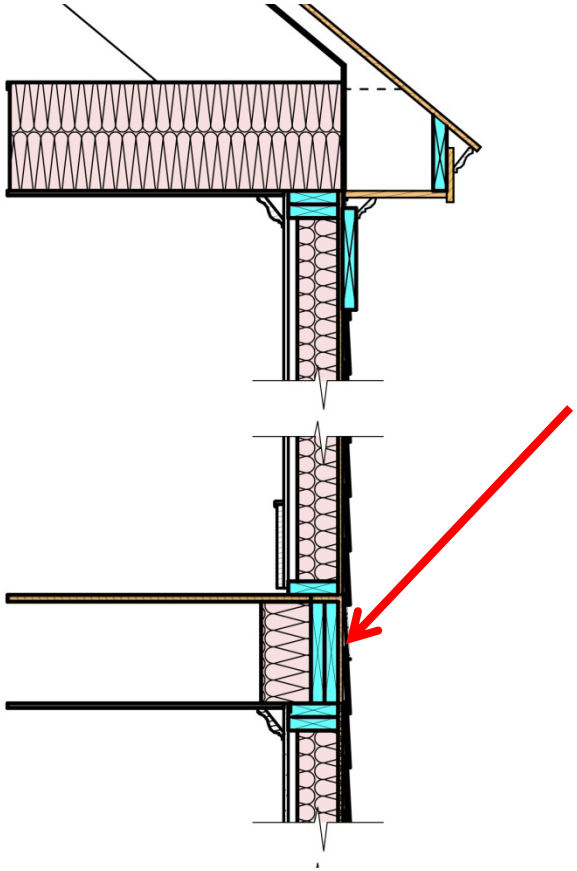
2009 IECC Requirements

Rim Joists

Rim joists are insulated and include an air barrier



Rim or band joist include an air barrier with insulation

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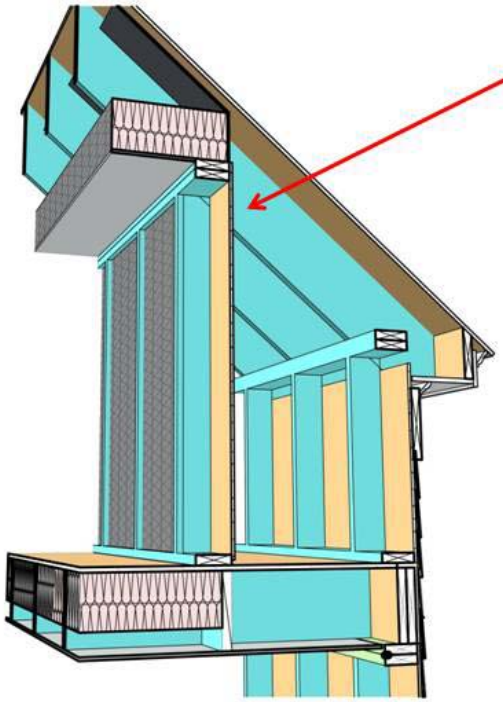
2009 IECC Requirements

Floors

Insulation is installed to maintain permanent contact with underside of subfloor decking
Air barrier is installed at any exposed edge of insulation



- Install Top and Bottom Plate
- Install Air Barrier Behind Knee Wall
- All Penetrations, Gaps & Cracks Sealed with Foam or Caulk

- Insulation to be Installed with Sufficient Supports to Maintain Contact with Subfloor

TIP – Best Practice
Install insulation with sufficient thickness to completely fill framing cavity

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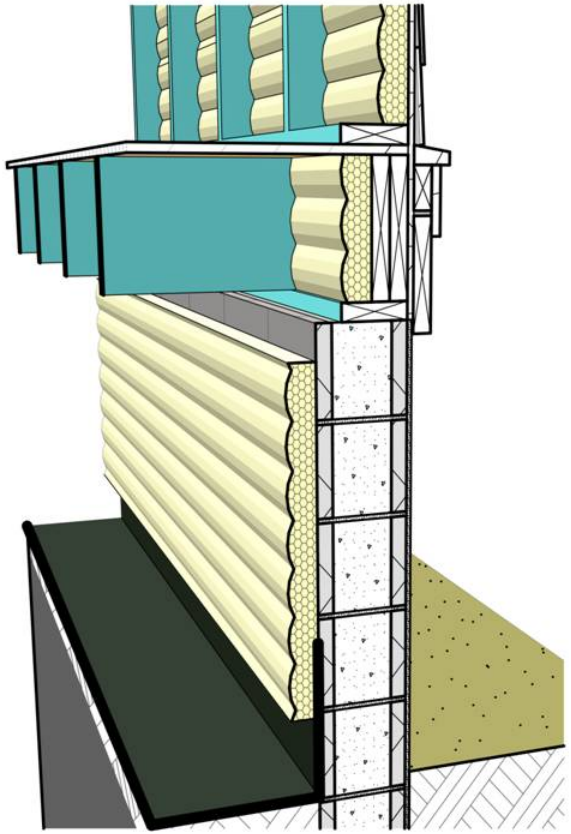
2009 IECC Requirements

Crawl Space Walls

Insulation is permanently attached to walls
Exposed earth in unvented crawl spaces is covered with Class 1 vapor retarder with overlapping joints taped

- Insulate Rim and Band Joists
- Maintain Gap for Termite Inspection

Minimum 6 mil Poly Lapped Up Wall 6 Inches Minimum and All Seams Overlapped and Taped



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2009 IECC Requirements

Shafts / Penetrations

Duct shafts, utility penetrations, knee walls and flue shafts opening to exterior or unconditioned space are sealed

Framed chases are sealed with an air barrier (top & bottom), sealed with expanding foam.

All penetrations (wires, plumbing, ducts, etc) are sealed as well

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2009 IECC Requirements

Narrow Cavities

Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed / blown insulation

Batt insulation must be cut to fit in narrow cavities. *"No fold-overs"*

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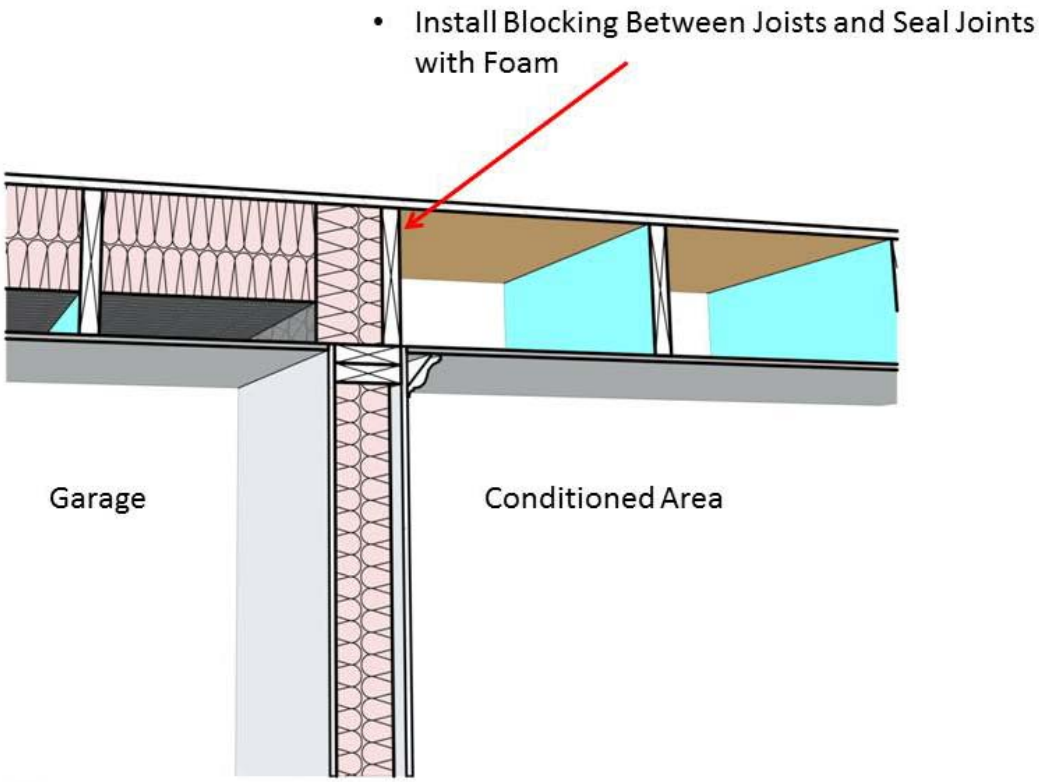
2009 IECC Requirements

Garage separation

Air sealing is provided between the garage and conditioned spaces



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2009 IECC Requirements

Recessed Lighting

Recessed light fixtures are air tight, IC rated and sealed to drywall.
Exception – fixtures in conditioned spaces

ICAT cans

Insulation
Contact
Air
Tight

Installed in ceilings with attic space above

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2009 IECC Requirements

Plumbing And Wiring

Insulation is placed between outside and pipes.
Batt insulation is cut to fit around wiring and plumbing, or spray / blown insulation extends behind piping and wiring

Insulation is installed in behind plumbing and wiring. Additional effort should be made to cut around plumbing to minimize fiberglass batt compression.

Note: 50% batt compression reduces the fiberglass batt R-value by 39%. (R-13 batt provides R-8 at that location)

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2009 IECC Requirements

Shower / tub on Exterior wall

Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.

Insulation and Air barrier installed behind tubs on exterior walls.

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2009 IECC Requirements

Electrical / phone Box on exterior Wall

An air barrier extends behind boxes or air sealed type boxes are installed

Electrical boxes installed for outdoor receptacles should either be air tight boxes or properly sealed.

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2009 IECC Requirements

Common Walls

Air barrier is installed in common wall between dwelling units

1” gap between fire rated wall assembly and unit wall framing blocked or sealed with fire rated foam

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2009 IECC Requirements

HVAC register boots

HVAC register boots that penetrate building envelope are sealed to subfloor or drywall

HVAC boots adjacent to attic or crawl spaces, sealed using caulk

Note: This 1/8" gap is a major contributor to duct leakage. The average home loses approximately ½ ton of conditioned air through this gap. When system is not running it is a source of outside air leakage as well.

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2009 IECC Requirements

Fireplace

Fireplace walls include an air barrier

Air barrier installed behind fireplace with flue piping sealed with fire rated caulk

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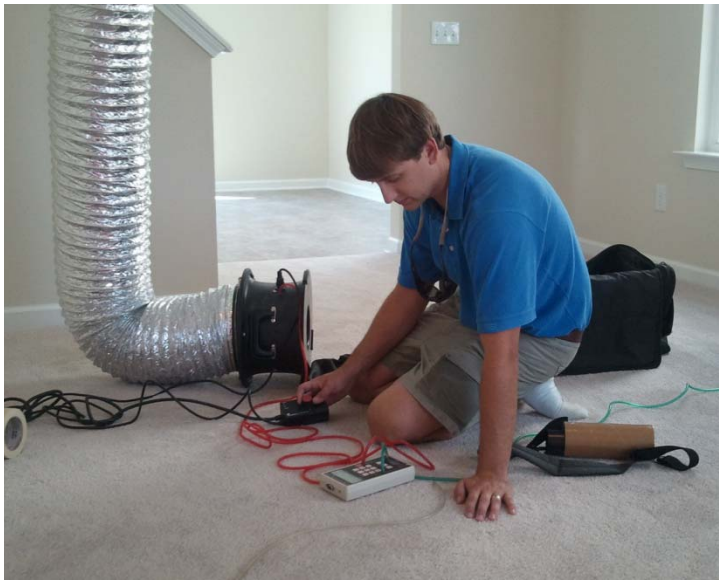
2009 IECC Requirements

Duct Testing

6 cfm / 100 SF – with Air Handler
4 cfm / 100 SF – without Air Handler

Option 1 – Rough in Test



8 cfm / 100 SF – Leakage to outdoors
12 cfm / 100 SF – Total leakage

Option 2 – Final Test

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2009 IECC Requirements

Air leakage verification

A qualified individual can perform a pre-drywall visual inspection to insure all blocking and air sealing measures have been performed.

Local code jurisdictions determine individual qualifications for visual inspections.

Option 1

Blower Door test to verify < 7 ACH

Option 2

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