



### Air Tightness

- 1.1. There shall be a continuous, durable air barrier enclosing the conditioned space. This includes features such as chases, knee walls, soffits, garage interfaces, intersecting walls, tubs and showers and dropped ceilings. Also, sheetrock shall be sealed to the top plates at all attic/wall interfaces using caulk, foam or equivalent.
- 1.2. Tightness shall be less than or equal to .30 CFM50 per square foot of conditioned envelope area. Among other areas, this will require attention to air sealing the sub-floor to bottom plate; holes under tubs; window and door rough openings; attic hatches and electrical, plumbing and mechanical penetrations.

### Ventilation and Moisture Management

- 2.1. There shall be a filtered whole-house mechanical fresh air ventilation system in compliance with ASHRAE 62.2.
- 2.2. All bathrooms shall have a fan vented to the outside that exhausts 20 CFM continuously or 50 CFM intermittently (for intermittent, requires a minimum fan rating of 70 CFM).
- 2.3. All kitchens shall have a fan vented to the outside that exhausts 100 CFM (requires a minimum fan rating of 120 CFM).
- 2.4. All ventilation ducts, excluding kitchen exhaust ducts, shall be insulated.
- 2.5. All ventilation ducts shall terminate at or beyond the exterior skin of the building.
- 2.6. All crawl spaces shall be closed in accordance with [www.crawlspaces.org](http://www.crawlspaces.org).

### Insulation and Windows

- 3.1. Insulation shall be installed per manufacturer specifications, with no substantial gaps, voids, compression or wind intrusion.

- 3.2. Insulation and the air barrier shall be installed in physical contact with each other.
- 3.3. Insulation levels shall, at minimum, equal those required by the 2009 IECC.
- 3.4. Raised heel trusses, or equivalent, shall be used to ensure full insulation value over the top plate of the exterior wall.
- 3.5. Wall framing techniques that reduce thermal bridging shall be used. Acceptable options include:
  - Continuous rigid insulation sheathing ( $\geq R-3$  in Climate Zones 1-4,  $\geq R-5$  in Climate Zones 5-8) OR
  - Structural Insulated Panels (SIPs) OR
  - Insulated Concrete Forms (ICFs) OR
  - Advanced framing including all of the items below:
    - a. Corners insulated  $\geq R-6$ ,
    - b. Header assemblies above windows and doors  $\geq R-6$  in CZ 1-4 or  $\geq R-8$  in CZ 5-8,
    - c. Framing limited at windows and doors to that which is structurally necessary,
    - d. Continuous insulation behind interior/exterior wall intersections using ladder blocking or a single partition stud, and
    - e. In general, exterior wall framing limited to that which is structurally necessary.
- 3.6. Windows and glass doors shall have an overall solar heat gain co-efficient (SHGC) of .30 or less and an overall U-value of .35 or less.
- 3.7. Homes in Climate Zones 1-4 with more than 10 linear feet of ductwork in the attic shall have a radiant barrier in the attic.



### HVAC Sizing and Installation

- 4.1. Heat pumps shall have a minimum SEER rating of 14 and a minimum HSPF of 8.2.
- 4.2. Heat pumps shall have an outdoor thermostat installed to prevent supplementary heater operation when the heat pump is capable of meeting the load.
- 4.3. Furnaces shall be 90 percent efficient and their cooling systems shall have a minimum SEER rating of 13.
- 4.4. All duct connections shall be sealed with a UL listed bucket mastic product.
- 4.5. Duct leakage, measured in cubic feet per minute at 25 Pascals, shall not exceed 3 percent of the conditioned square footage.
- 4.6. Mechanical systems shall be sized to within ½ ton of the ACCA Manual J. ACCA Manual J room-by-room load calculations, including all inputs, shall be submitted for each plan to verify sizing.
- 4.7. The measured airflow for each room shall be within +/- 10 percent of the ACCA Manual J calculation.
- 4.8. Refrigerant charge shall be installed per manufacturer specifications.
- 4.9. Inert gas (nitrogen) shall be used during any brazing/soldering of refrigerant lines.
- 4.10. Indoor and outdoor system components shall be “matched” according to the Air Conditioning and Refrigeration Institute (ARI) directory.

### Pressure Balancing

- 5.1. All rooms within the conditioned space – except baths and laundry – shall not exceed +/- 3 Pascals pressure differential with respect to the outside

when interior doors are closed and the air handler is operating. Returns, transfer grilles or jump ducts shall be used to balance each room in addition to door undercuts.

### ENERGY STAR and Appliances

- 6.1. Home shall have an ENERGY STAR® labeled refrigerator, dishwasher or clothes washer if any is supplied to the home.
- 6.2. Home shall not have any incandescent lights.
- 6.3. Recessed lights, if used, shall be air tight and Insulation Contact (IC) rated.
- 6.4. Electric water heaters shall have an energy factor (EF) of at least .93. Gas water heaters shall have an EF of at least .61.
- 6.5. From the water heater, the first 3 feet of hot and cold pipes shall be insulated to  $\geq$  R-4.
- 6.6. Toilets shall be 1.3 gallons per flush (GPF) or less (including dual-flush models). Showerheads shall be 2.25 gallons per minute (GPM) or less. Kitchen faucets shall be 2.2 GPM or less. Bath faucets shall be 1.5 GPM or less.

### Combustion Safety

- 7.1. Any combustion appliance inside of the conditioned space, other than gas ranges and wood fireplaces, must be direct vent or power vented. Vent-free gas logs are not allowed.
- 7.2. One hard-wired carbon monoxide (CO) detector shall be installed per 1,000 sq. ft. of living space in homes that have any combustion appliance within the conditioned space or an attached garage (minimum 1 per floor).



## MATERIALS SELECTION

We've put the following list together to help you in your materials selection. The first section includes items that are typically ordered in the process, followed by four sections of materials for which sub-contractors are usually responsible. Use this list as you wish, and please let Advanced Energy know how it could be improved!

### Earlier

- Air-sealing and blocking materials: Caulk, Sill Seal, Foam, Backer Rod, Thermo Ply, Energy Brace, Blue Board, etc. as needed
- Raised heel trusses, minimum 10 in. clearance between exterior of top plate and roof deck
- Windows and glass doors with an overall U-value of .35 or less and an overall solar heat gain coefficient (SHGC) of .30 or less
- ENERGY STAR labeled refrigerator, dishwasher or clothes washer if home includes this appliance (Whirlpool-donated HFH refrigerators qualify)
- Any combustion appliance inside of the conditioned space, other than gas ranges and wood fireplaces, must be sealed-combustion direct vent or power vented
- No vent-free gas logs
- Radiant barrier in attic if there is more than 10 linear feet of ductwork in the attic
- See Foundation Section for additional applicable materials

### Later

- Weather-stripping for attic hatch and crawl space door
- Radon test kit
- See Foundation Section for additional applicable materials

### HVAC

- Insulated 6-8 in. duct from outside of home to return box within home with manual damper and filter
- Approved room-by-room load calculation
- Unit sized within ½ ton of room-by-room load calculation
- Split systems matched according to the ARI directory
- Air flow within +/- 10 percent of room-by-room load calculation
- Bucket mastic to seal all duct connections
- Heat pump specs: Minimum SEER 14, minimum HSPF 8.2 with an outdoor thermostat to lock out strip heat above the balance point (~35 degrees Fahrenheit)
- Refrigerant charge per manufacturer specifications
- Inert gas (nitrogen) to braze or solder refrigerant lines
- Furnace specs: Minimum 90 percent efficient
- Pressure balancing: Individual returns, jumper ducts or transfer grilles for each closed room (except baths and laundry), no smaller than the supply air pathway size to the room
- See Foundation Section for additional applicable materials

### Electrician

- Minimum 70 CFM rated fans in baths sealed with bucket mastic to insulated ducts ducted to daylight
- Minimum 120 CFM rated fan in kitchen above range ducted to daylight
- If used, recessed lights must be airtight and IC-rated



## MATERIALS SELECTION

- One hard-wired CO detector per 1,000 sq. ft. of living space in homes that have any combustion appliance within the conditioned space or an attached garage (minimum 1 per floor)
- No incandescent lighting
- See Foundation Section for additional applicable materials

### Plumber

- Water heater: If electric, minimum .93 EF; if gas, minimum .61 EF
- Insulation for the first 3 ft. of hot and cold water piping
- Toilets  $\leq$  1.3 GPF
- Showerheads  $\leq$  2.25 GPM
- Kitchen faucets  $\leq$  2.2 GPM
- Bath faucets  $\leq$  1.5 GPM
- See Foundation Section for additional applicable materials

### Insulator

- Insulation R-values equal to those required by the 2009 IECC
- See Foundation Section for additional applicable materials