

System Vision for Existing Homes

Program Standards

1. General

- 1.1. Where feasible, the Department of Energy Single Family Work Specifications (see Standard Work Specifications at <https://sws.nrel.gov/>) shall be referenced and incorporated into work performed under the SV-E Program.
- 1.2. All major structural and durability concerns must be addressed prior to the retrofit

2. Attic- Ceiling & Knee Walls

- 2.1. 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 and dropped ceilings.
- 2.2. Air sealing shall be required at the attic plane - Any visible hole or crack leading from the attic into the building or building cavities shall be sealed (e.g., plumbing penetrations, electrical penetrations, chases, dropped soffits, chimney penetrations, top plate-to-drywall connections, bonus room floors, balloon framing).
- 2.3. Insulation shall be installed at walls and ceilings to manufacturer specifications with no gaps, voids, compression or wind intrusion.
- 2.4. Insulation and the air barrier shall be installed in physical contact with each other.
- 2.5. Accessible attics shall be insulated to R-38 or greater.
- 2.6. Knee walls shall be insulated and backed with support material.
- 2.7. Attic accesses will be insulated to a minimum of R-30. This will require an insulated box be constructed for attic pull-down stairs.

3. Exterior Walls - Including Windows & Doors

- 3.1. There shall be a continuous, durable air barrier enclosing the conditioned space. This includes features at garage & storage interfaces and attached porches.

- 3.2. Air sealing shall be required at the exterior walls - Windows, doors, and any visible hole or crack leading from the building to the exterior shall be weather-stripped or sealed.
- 3.3. When installed insulation shall be to manufacturer specifications with no gaps, voids, compression or wind intrusion.
- 3.4. When installed, insulation and the air barrier shall be in physical contact with each other.
- 3.5. Replacement windows, if installed, shall be ENERGY STAR labeled.

4. Foundation- Crawl Space and Basement

- 4.1. There shall be a continuous, durable air barrier enclosing the conditioned space.
- 4.2. Air sealing shall be required at the subfloor - All penetrations between conditioned and unconditioned space shall be sealed.
- 4.3. Insulation shall be installed and/or fixed in floors to manufacturer specifications with no gaps, voids, or compression.
- 4.4. For vented crawls, floors must be insulated to meet code. For closed crawl spaces, foundation wall or floors shall be insulated to code.
- 4.5. Insulation and the subfloor shall be installed and/or fixed to be in physical contact with each other.
- 4.6. All crawl spaces shall have a 100 percent ground cover as required by the NC building code. When the crawl space is likely to be accessed by homeowner or for equipment repairs, reinforced ground cover, thicker poly, or additional protective layers shall be used in traffic areas and around equipment.
- 4.7. Houses having crawl spaces with standing water or signs of water shall not be included in the program unless drainage is a part of the retrofit.

5. Heating & Cooling- Equipment & Ductwork

- 5.1. New and existing heat pumps shall have an outdoor thermostat installed and set to the balance point of the house to prevent supplementary heater operation when the heat pump is capable of meeting the load.
- 5.2. All accessible duct connections shall be sealed with a UL-listed bucket mastic product.

- 5.3. Where more than 50% of ducts are replaced, and all ducts are accessible, ducts shall meet a target of 3% total duct leakage.
- 5.4. All uninsulated ductwork outside the conditioned envelope shall be insulated to R-8.
- 5.5. New mechanical systems shall be sized to within ½ ton of an ACCA Manual J load calculation. ACCA Manual J load calculations, including all inputs, shall be submitted for each replacement unit to verify sizing.
- 5.6. Replacement heating and cooling systems shall be rated at or above the following efficiencies:

Furnace	90%
AC (w/furnace)	13 SEER
Heat Pumps	14 SEER/8.2 hspf

6. Ventilation – Whole Home & Spot

- 6.1. There shall be a whole-house mechanical fresh air ventilation system in compliance with ASHRAE 62.2., 2010.
- 6.2. All bathrooms with showers or bathtubs shall have a fan vented to the outside exhausting at a rate of 50 CFM intermittent (requires a minimum fan rating of 70 CFM)
- 6.3. All kitchens shall have a fan vented to the outside that exhausts 100 CFM (requires a minimum fan rating of 120 CFM).
- 6.4. All ventilation ducts shall terminate at or beyond the exterior skin of the building.

7. Lighting and Appliances

- 7.1. All light fixtures shall utilize compact fluorescent lamps (CFLs), light emitting diodes (LEDs) or tubular fluorescent bulbs.
- 7.2. Appliances (e.g. refrigerator, dishwasher, clothes washer), if installed, shall be ENERGY STAR labeled.
- 7.3. New water heaters should be rated at or above the following efficiencies

Electric Water Heaters	0.94 EF
Gas Water Heaters	0.61 EF

8. Combustion Safety

- 8.1. If existing gas equipment will remain atmospherically vented after the energy efficiency retrofits, BPI protocol or other Advanced Energy approved combustion safety testing protocol must be completed.
 - 8.1.1. Combustion safety tests shall be performed before and after the retrofit, as well as before leaving a multi-day retrofit.
 - 8.1.2. Results shall be documented and repairs must be performed immediately, once a negative result is discovered (e.g., pressure balancing, gas leaks repaired, correction to venting, increased make-up air).
- 8.2. Homes containing vent-free gas logs or space heaters shall not be retrofitted until units are removed.
- 8.3. If gas equipment is replaced and gas appliances are installed inside of the conditioned space, other than gas ranges, the new appliances shall be direct-vent or power-vented.
- 8.4. One carbon monoxide (CO) detector shall be installed outside of each bedroom area and to manufacturer specifications in homes that have a combustion appliance or an attached garage (minimum 1 per floor).