

SystemVision for New Homes Program Standards 2019

1. Air Tightness

- 1.1. *Air tightness* shall be less than or equal to .20 CFM50 per square foot of conditioned envelope area.
- 1.2. All *air leakage* paths from the home to the crawl space and from the crawl space to outside shall be air sealed.
*For air sealing checklist details, see www.systemvision.org.

2. Moisture Management and Indoor Air Quality

- 2.1. *Drainage*: Finished grade shall be sloped away from foundation walls or slab. Surface drainage shall be diverted to a storm sewer conveyance or other approved point of collection that does not create a hazard. Lots shall be graded to drain surface water away from foundation walls. The grade shall fall a minimum of 6 inches (152 mm) within the first 10 feet (3,048 mm) from the foundation walls. For exceptions, see the North Carolina Residential Building Code Section R401.3.
- 2.2. *Slabs*: A ground vapor/moisture barrier with a rating of no more than 0.1 perm shall be installed under the slab and have 100% coverage with overlapped seams.
- 2.3. *Crawl Spaces*: All crawl spaces shall be closed and have the following components:
 - 2.3.1. A sump pump or drain to daylight with a backflow preventer shall be located at the lowest point of the crawl space.
 - 2.3.2. All air leakage paths from the home to the crawl space and from the crawl space to outside shall be air sealed.
 - 2.3.3. Vapor/Moisture Barrier
 - 2.3.3.1. Walls: Vapor/moisture barrier shall be sealed, mechanically fastened and run up walls to within 3 inches of mudsill.
 - 2.3.3.2. Floors: Vapor/moisture barrier shall be sealed at all seams and penetrations and to wall vapor/moisture barrier.
 - 2.3.4. Drying Mechanism: A standalone dehumidifier or supply register with backflow preventer that provides 1 CFM/30SF of floor area.
 - 2.3.5. For the duration of construction, crawl spaces shall have at least (1) a vapor/moisture barrier covering the ground.
(2) a drying strategy (e.g., temporary crawl space vents or a dehumidifier).
- 2.4. *Metal drip edge* flashing shall be installed on all roof edges according to National Roofing Contractors Association or manufacturer specifications.
- 2.5. *Roof overhang depth* from the face of the wall to the face of the fascia must be a minimum of 12 inches.
- 2.6. Only if installed, *gutters* must have downspouts that terminate at least 5 feet away from the foundation and be independent of the foundation drain system.
- 2.7. At least one entry will have a *weather-protected overhang* of 3 feet in depth and a width of at least 18 inches from either side of the entry's rough opening.

3. Framing and Insulation

- 3.1. *Roof framing* shall allow for 10 inches of vertical space from the exterior of the top-plate to roof sheathing.
- 3.2. *Insulation* shall be installed to the Insulation Institute's or manufacturer's specifications, with no gaps, voids, compression or wind intrusion. Insulation and the continuous air barrier shall be installed in physical contact with each other.
- 3.3. *Attic accesses* shall be insulated to a minimum of R-30. Insulation must be securely fastened. This will require an insulated, air sealed and weatherstripped box to be constructed for attic pull-down stairs.

3.4. Insulation levels shall, at minimum, equal those in the following table.

Climate Zone	Slab	Walls	Ceiling**	Floors*	Crawl Space Walls*
3	NA	R-19 or R-15 + 3 cont	R-38	R-19	R-5 cont
4	R-10	R-19 or R-15 + 3 cont	R-49	R-19	R-10 cont
5	R-10	R-21 or R-15 + 5 cont	R-49	R-30	R-15 cont

To locate climate zone, see https://up.codes/viewer/north_carolina/iecc-2009/chapter/3/climate-zones#3

*Closed crawl spaces require either the subfloor or walls to be insulated.

**If using spray foam at the roof deck to create a sealed attic, use a minimum of 6 inches of either open or closed cell spray foam and covering the roof rafters.

3.5. In and around a crawl space, if insulation is installed at the foundation walls, insulated framed walls must be covered with a rigid air barrier and air sealed on all six sides, crawl space access shall be insulated with a minimum of R-5 rigid insulation securely fastened, and access shall be air sealed and weatherstripped to the outdoors.

4. Heating, Air Conditioning and Ventilation

4.1. *Equipment Minimum Performance Values:*

4.1.1. Furnaces: At least 90% efficient

4.1.2. AC: At least 14 SEER

4.1.3. Heat Pumps: At least 14 SEER and 8.2 HSPF

4.2. All *duct connections* shall be sealed with a UL-listed “bucket” mastic product.

4.3. *Total duct leakage*, measured in cubic feet per minute at 25 Pascals, shall not exceed 3% of the conditioned square footage. Building cavities shall not be used as ducts.

4.4. *Mechanical systems* shall be sized to within 6,000 Btuh (or closest available size) of the whole-home ACCA Manual J total load. ACCA Manual J room-by-room load calculations, including all inputs and outputs, shall be submitted for each plan to verify sizing. A physical copy of the load calculation with the AHRI certificate shall be attached to the AHU or submitted to the rater prior to the final inspection.

4.5. *Heat pumps* shall have an outdoor thermostat installed to prevent supplementary heater operation when the heat pump is capable of meeting load. The lockout shall be set no lower than 35F and no higher than 40F.

4.6. The *measured airflow* for each room shall be within +/- 20% or 25 CFM of the ACCA Manual J calculation. This will require supply dampers to be installed for bedrooms and bathrooms.

4.7. *Total system airflow* shall be set between 300 and 400 CFM per ton in cooling or to total system airflow as specified by the manufacturer.

4.8. *Whole-House Ventilation:* There shall be a filtered whole-house mechanical fresh air ventilation system capable of meeting the current version of ASHRAE 62.2 that complies with one of the following options:

Option 1: *Supply Ventilation:* Air handler cannot have a PSC motor. System shall be designed to operate intermittently and automatically based on a timer and restrict outdoor air intake when not in use (e.g., motorized damper). Ventilation at a minimum shall occur 10% of every 24 hours and at a maximum 50% of every 24 hours. If additional ventilation is needed, Advanced Energy will adjust the guarantee to account for additional energy usage.

Option 2: Design and install an approved *balanced ventilation* strategy including ERVs or HRVs.

4.9. *Spot Ventilation:* All ventilation ducts shall terminate beyond the exterior skin of the building.

4.9.1. All bathrooms shall have a fan vented to the outside that exhausts 50 CFM intermittently. (Requires a minimum fan

rating of 70 CFM.)

4.9.2. All kitchens shall have a fan vented to the outside that exhausts 100 CFM. (Requires a minimum fan rating of 120 CFM.)

4.10. All *ventilation ducts*, excluding kitchen exhaust ducts, shall be insulated.

5. 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 main body when interior doors are closed and AHU is operating. Returns, transfer grilles or jump ducts shall be used to balance each room in addition to door undercuts.

6. Plumbing

6.1. Water heaters shall have a UEF as indicated in the table:

Water Heater Type	UEF Value
Electric Tank	.93
Gas Tank	.60
Gas Tankless	.61
Heat Pump	Any

6.2. From the water heater, the first 3 feet of hot and cold pipes shall be insulated to $\geq R-4$.

6.3. Toilets shall be 1.3 GPF or less (including dual-flush models). Showerheads shall be 2.25 GPM or less. Kitchen faucets shall be 2.2 GPM or less. Bath faucets shall be 1.5 GPM or less.

7. Appliances & Lighting

7.1. Dishwashers and refrigerators, if provided by the builder, shall be ENERGY STAR® certified.

7.2. Home shall not have any incandescent lights. All exterior lighting shall use LEDs.

8. Aging in Place/Visitability

8.1. One house entry door, one bedroom entry and one bathroom entry must be a minimum of 32 inches clear. A visitable route from an exterior entrance through interior hallways must provide access to these interior entries, and this route must be a minimum of 36 inches clear throughout.

8.2. One bathroom shall have *continuous blocking* in walls using a minimum of 2x6 with the bottom located 31 inches above the floor around both toilet and shower to allow for future grab-bar installation.

9. Combustion Safety and Radon Mitigation

9.1. Any *combustion appliance* inside the conditioned space or closed crawl space, other than gas ranges, shall be direct (sealed) vent or power (fan) vented. Vent-free gas logs and wood fireplaces are not allowed.

9.2. One hard-wired *CO detector* shall be installed per 1,000 square feet of living space (minimum one per floor) in homes with any combustion appliance located within the conditioned space or that have an attached garage.

9.3. Radon-ready house/passive mitigation: Install a 3 to 4 inch diameter PVC pipe T-fitting from below the crawl space liner or slab. Connect it to a pipe that runs vertically through the house and exhausts to the exterior a minimum of 12 inches above the roof and 10 feet from openings into conditioned spaces. Install a power supply accessible to the upper top 50% of the pipe in case there is a need to convert to an active radon system.

Acronyms and Abbreviations

AC	Air conditioners
ACCA	Air Conditioning Contractors of America
AHRI	Air-Conditioning, Heating, & Refrigeration Institute
AHU	Air handling unit
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
Btuh	British thermal units per hour
CFM	Cubic feet per minute
CFM50	Cubic feet per minute at 50 Pascals
CFM/30SF	Cubic feet per minute per 30 square feet
CO	Carbon monoxide
cont	Continuous insulation
ERV	Energy recovery ventilator
F	Degrees in Fahrenheit
GPF	Gallons per flush
GPM	Gallons per minute
HRV	Heat recovery ventilator
HSPF	Heating Seasonal Performance Factor
IECC	International Energy Conservation Code
LED	Light-emitting diode
mm	Millimeters
NA	Not applicable
Perm	Unit of measure for the water vapor permeability of a material
PSC	Permanent split capacitor
PVC	Polyvinyl chloride
SEER	Seasonal Energy Efficiency Ratio
UA	Sum of U-factor times assembly area. May be used to determine code compliance for insulation when using an alternate compliance path.
UEF	Uniform Energy Factor
UL	Underwriters Laboratories