The building thermal envelope must meet the requirements listed below. For slabs, insulation should be installed along the slab perimeter. Insulation should never be compressed or installed in a manner that creates gaps (insulation should be continuous and directly in contact with an air barrier material such as drywall).

Insulation & Window Requirements

**HVAC: Key Details**

- **Solar Heat Gain Coefficient:** must be 0.30 for zones 3 & 4, zone 5 none required.
- **U-factor:** must be 0.35 or less for all zones
- **Exemptions:** 15 ft.² of total glazed fenestration may be exempt from U-factor & SHGC requirements

**Duct Sealing**

- Duct Sealing -- All ducts, air handlers, filter boxes and building cavities used as ducts must be sealed.
- Tapes & mastics used to seal ductwork must be:
  - Listed & labeled in accordance with UL 181A and UL 181B
  - Must be marked “181 A-P” for pressure sensitive tape, “181 A-M” for mastic or “181 A-H” for heat-sensitive tape
  - All other ducts: R-6 minimum
  - Ducts completely inside conditioned space: none required

**Mandatory Duct Testing**

- Testing shall be performed and reported by the permit holder, a NC licensed general contractor, a NC licensed HVAC contractor, a NC licensed Home Inspector, a registered design professional, a certified BPI Envelope Professional or a certified HERS rater.
- Total duct leakage or leakage to the outside must be less than or equal to 6 CFM (12 L/min) per 100 ft² (9.29 m²) of conditioned floor area served by that system when tested at a pressure differential of 25 Pa across the entire system, including the manufacturer’s air handler enclosure.

**Duct Insulation**

- Exterior or attic supply and return ducts: R-8 minimum
- Flexible ducts shall be marked “181B-FX” for pressure-sensitive tape or “118B-M” for mastic.
- Mechanical fasteners shall be marked “181B-C”

**Thermostat**

- Heat pumps having supplementary electric-resistance heat shall have controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.
- A heat strip outdoor temperature lockout shall be provided to prevent supplemental heat operation in response to the thermostat being changed to a warmer setting.

**Windows**

- Solar Heat Gain Coefficient: must be 0.30 for zones 3 & 4, zone 5 none required.
- U-factor: must be 0.35 or less for all zones
- Exemptions: 15 ft.² of total glazed fenestration may be exempt from U-factor & SHGC requirements

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* Zones 4 & 5: R-30 can be used in attics w/full insulation over exterior wall. In ceilings without attic spaces, 500 ft.² can be R-30.
Air Sealing & Backing Materials

Backers of insulation required for knee walls, tubs, showers, fireplace inserts, and stairs on exterior walls.

Air Sealing required under knee walls, balloon-framed walls, shafts, chases, dropped soffits, and HVAC boots.

Two Options for Advanced Air Sealing:

Air Sealing: Testing Option 1
Visual inspection for: top plates, sill plates, window and exterior door jambs, utility penetrations, floor edges, between garage and ceiling spaces, duct boots and return boxes, and recessed lighting.

Air Sealing: Testing Option 2
Blower Door Test -0.30 CFM50/Square Foot of Surface Area (SFSA) or Five (5) air changes per hour (ACH50) or less.

Attic knee-walls

Caulk and seal rough opening
Rigid insulation Minimum R-5
Weather-stripe door opening and threshold

Attic pull-down stairs and accesses

Seal gap between frame and rough opening with caulk, backer rod, or foam
Weatherstripping
Panel
Insulation options

Shower/tub drain opening

Backer Material
Seal completely

Two-level attic

Unconditioned Space
Caulk
Attic knee wall requires R-13 insulation
Blocking
Conditioned Space
Caulk Glue

Conditioned Space
Weatherstripping