# APPENDIX F

Supportive Housing Development
Energy Efficiency Standards

## Contents

# New Construction Projects

## 1. Energy Efficiency Certification

At a minimum, all new construction projects must comply at minimum with the Agency's **Supportive Housing Energy Efficiency Standards** or to the standards of an Agency approved energy-related building certification program as verified by an independent, third-party expert who assists with project design, verifies construction quality, and tests completed units. Adaptive re-use and rehabilitation projects must comply to the extent that doing so is economically feasible and, if applicable, as allowed by historic preservation rules.

Applicants are encouraged to explore higher levels of energy efficiency, sustainability and indoor air quality as certified by one of the following nationally recognized building certification programs. NCHFA must review and approve the contract between the applicant and verifier before it will issue a final commitment letter for the project and must receive and approve a Certification from the selected energy efficiency program prior to Loan Closing.

Acceptable programs include the current versions of:

- For single family/residential housing:
  - EarthCraft by Southface
  - Enterprise Green Communities
  - NGBS Green National Green Building Standard Program
  - ENERGY STAR for New Homes Residential New Construction Program
  - ENERGY STAR Nextgen
  - NCECC HERO Standards Program by Duke Energy Progress (May only apply while the 2018 NC Building Code in effect)
  - LEED by US Green Building Council
  - SystemVision for Single Family Homes by Advanced Energy
- For multi-family/commercial housing:
  - Energy Star for Multi-Family 1.1 or current NC applicable program
  - NGBS Green National Green Building Standard Program
  - Earthcraft Multifamily
  - LEED for Multifamily

Projects must reference **Supportive Housing Energy Efficiency Standards** as a baseline for performance design. However, projects may also choose to pursue any of certifications above, or may request approval for other energy efficiency/green building programs/standards that exceed the Support Housing Energy Efficiency Standards. If the applicant wishes to participate in a different energy efficiency certification program, the program must be reviewed and approved by the Agency prior to the issuance of a Final Commitment Letter.

In regard to energy efficiency code targets for the building envelope/air sealing, insulation/framing, ventilation, water heating, and HVAC equipment, projects should design to attain HERS 60 or greater

levels of efficiency for the respective climate zone of the project. Projects should work with their energy consultant to decide if they will choose an approved certification program for the project, or if they will design the project to meet HERS 60 energy efficiency performance standards for the building envelope/air sealing, insulation/framing, ventilation, water heating, and HVAC equipment.

## 2. Minimum Building Component Standards for New Construction, Replacement, and Substantial Rehabilitation

At a minimum, any component of the building which is installed or replaced, must meet the following standards:

| | |
|---|---|
| All Appliances | Energy Star (Contact NCHFA if unable to find available E-star appliances for needs of clients/project) |
| Windows/Fenestration | Insulated, double pane, U-factor of 0.35 or below and a SHGC of 0.30. Meet IECC 2021 (Table R402.1.2) |
| Shingles | Algae resistant (AR) with a minimum 30-year warranty |
| Faucets, Shower heads and Toilets | EPA “Watersense” labeled |
| Light Fixtures | Initially installed light bulbs in all fixtures must be fluorescent, LED, or pin-based lighting |
| Cooling | AC w/furnace: SEER 13<br>Heat Pump: 15 SEER/8.8 HPSF |
| Heat | Gas: 90% Efficiency or Greater,<br>Heat Pump: 15 SEER/8.8 HPSF |
| Insulation | Meet HERS 60 (if framing allows for substantial rehab) |
| Insulation – Attic | Meet HERS 60 |
| Insulation - Floor | Meet HERS 60 |
| Electric Tank Hot Water Heater | At least UEF Value of 0.93 or EF Factor of 0.95 |

# Supportive Housing Energy Efficiency Standards for New Housing

## 1. General Requirements

1.1. Building plans must be submitted to Energy Consultant that incorporate all standards into the drawings, details and/or notes. The plans will be reviewed by Energy Consultant for incorporation of standards and project team will be asked to update plans if any items are unclear or missing.

1.2. The general contractor, HVAC contractor and insulation contractor must attend a pre-construction meeting prior to work beginning on project.

## 2. Air Tightness

2.1. There shall be a continuous, rigid and durable air barrier enclosing the conditioned space. The building plans, and building, shall demonstrate a continuous, unbroken air barrier separating the conditioned space of the building from unconditioned spaces.

2.2. The air barrier will be denoted and labeled as the “air barrier” in the plans on all sections, floor-plans, and appropriate details.

2.3. Living units shall be sealed to reduce air exchange between the apartment and outside as well as the apartment and other adjacent spaces. Unit and/or Building air leakage shall be less than or equal to .30 CFM50 per square foot of conditioned envelope area.

## 3. Ventilation and Moisture Management

3.1. There must be a whole-house mechanical fresh air ventilation system in compliance with the current version effective in North Carolina of ASHRAE 62.2 for each living unit. Compliant system types include:

- Supply duct tied into return box or plenum of HVAC system (must contain damper and filter; filter must be easily accessible for service); or
- Exhaust fan and timing device, wired to run intermittently; or
- Balanced ventilation (e.g., Energy Recovery Ventilator).

3.2. All common and non-residential space must have a mechanical fresh air ventilation system in compliance with the current version effective in North Carolina of ASHRAE 62.1.

3.3. All bathrooms shall have a fan ducted to the outside which, as installed, exhausts at least 50 CFM intermittently (requires a minimum fan rating of 70 CFM).

3.4. All kitchens shall have a fan ducted to the outside which, as installed, exhausts at least 100 CFM (requires a minimum fan rating of 120 CFM).

3.5. All ventilation ducts in unconditioned spaces, excluding kitchen exhaust ducts, shall be insulated.

3.6. Crawl Spaces: Shall be closed and have the following components:

3.6.1. A sump pump or drain to daylight with a backflow preventer shall be located at the lowest point of the crawl space.

3.6.2. All air leakage paths from conditioned space to the crawl space, and from the crawl space to outside shall be air sealed.

3.6.3. Vapor/Moisture Barrier.

3.6.3.1. Walls: vapor/moisture barrier shall be sealed, mechanically fastened, and run up walls

to within 3” of mudsill.

3.6.3.2. Floors- vapor/moisture barrier shall be sealed at all seams, penetrations and to wall vapor/moisture barrier.

3.6.3.3. Drying Mechanism.

3.6.3.4. A stand-alone dehumidifier or supply register with backflow preventer that provides 1 CFM/30SF of floor area.

3.6.3.5. Crawl spaces during construction shall have the following:

- A vapor/moisture barrier covering the ground.
- If crawl space vents are used, they will be sealed when construction is complete.
- If crawl space vents are not used, a drying strategy may be needed during construction.

3.7. 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.

3.8. 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 (3048 mm) from the foundation walls. For exceptions, see the NC Residential Building Code Section R401.3.

3.9. All buildings must have gutters that empty into lateral piping that discharges water more than 5ft from foundation or utilize an underground catchment system that does not tie into the foundation drain system that deposits water more than 10ft from foundation.

## 4. Insulation

4.1. 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.

4.2. Insulation and the air barrier shall be installed in complete and continuous physical contact with each other. Note that attic insulation may not be “tented” over sprinklers and another acceptable means of freeze protection in accordance with the applicable NFPA 13 is required.

4.3. All insulation values at a minimum must meet at least the 2015 International Energy Conservation Code (or current North Carolina Energy Efficiency code if higher). Performance or prescriptive path is acceptable.

## 5. Heating, Air Conditioning, and Ventilation

5.1. Residential Equipment Minimum Performance Values for Non-Commercial HVAC Systems:

- Furnaces: at least 90% efficient
- AC: at least 15 SEER
- Heat Pumps: at least 15 SEER and 8.8 HSPF

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

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

5.4. Total duct leakage, measured in cubic feet per minute at 25 pascals, shall not exceed the greater of EITHER 3% of the conditioned square footage OR 25 CFM. Building cavities shall not be used as ducts.

5.5. Heating and cooling systems shall be sized to within 6000 btu (or closest available size) of the whole home ACCA Manual J room-by-room load calculations. Load calculations shall be done using an ASHRAE or ACCA approved method.

5.6. The detailed load calculations showing all inputs and equipment specifications must be submitted to Energy Consultant as part of the plan review process. Physical copy of the AHRI certificate shall be attached to air handler unit or submitted to Energy Consultant prior to the final inspection.

5.7. Total system airflow shall be set between 300-400 CFM per ton in cooling, or set to total system airflow as specified by the manufacturer.

## 6. Pressure Balancing

6.1. 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 the air handler is operating. Returns, transfer grilles or jump ducts may be required to balance each room in addition to door undercuts.

6.2. Closets without their own air supply shall must have a 4” tall by 8” wide minimum pass-thru grille above doors for air circulation.

6.3. There must be a minimum of ¾ inch air space under all interior doors measured from finished floor for air circulation.

## 7. Plumbing

7.1. Water heaters shall have a Uniform Energy Factor (UEF) as indicated in the table:

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

7.2. From the water heater, the first three feet of hot and cold pipes shall be insulated to ≥ R-4.

7.3. 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.

## 8. Appliance and Lighting

8.1. If units are supplied with refrigerators and dishwashers, ENERGY STAR labeled models shall be installed.

8.2. All lighting fixtures shall be ENERGY STAR qualified or have fluorescent or LED lamps installed. T-8 tubular and circular fluorescents are acceptable. No incandescent lights shall be used.

8.3. Recessed lights, if used, shall be air tight and insulation contact (IC) rated.

## 9. Combustion Safety

9.1. Any *combustion appliance* inside the conditioned space, other than gas ranges and wood fireplaces, must be direct vent or power vented. Vent free gas logs are not allowed.

9.2. One *hard-wired carbon monoxide (CO) detector* shall be installed per bedroom area in buildings which have any combustion appliance within the conditioned space or which have an attached garage (minimum 1 per floor).

## Supportive Housing Rehabilitation Standards

Rehabilitation projects shall incorporate components meeting the Minimum Building Component Standards stated above to the extent that doing so is economically feasible and, if applicable, as allowed by historic preservation rules. Components that will not be made accessible by rehabilitation, or for which costs will not allow replacement of them and they are in good working order, are not expected to be replaced for the purpose of meeting these standards.

### 1. General

a. All work shall be clearly evaluated and detailed in a scope of work. Where feasible and applicable, scope of work must address how to safely and legally perform work and address combustion safety, worker safety, lead-based paint, and other hazardous materials.

b. All major structural and durability concerns must be addressed.

### 2. Attic – Ceiling & Knee Walls

When made easily accessible by rehabilitation and when applicable or when a related building component is replaced it shall be replaced according to this standard:

a. 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.

b. 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).

c. Insulation shall be installed at walls and ceilings to manufacturer specifications with no gaps, voids, compression or wind intrusion.

d. Insulation and the air barrier shall be installed in physical contact with each other.

e. Accessible attics shall be insulated to R-38 or greater.

f. Knee walls shall be insulated and backed with support material.

g. 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

When made easily accessible by rehabilitation and when applicable or when a related building component is replaced it shall be replaced according to this standard:

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

b. 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.

c. When installed insulation shall be to manufacturer specifications with no gaps, voids, compression or wind intrusion. Insulation shall be insulated to R5 or greater.

d. When installed, insulation and the air barrier shall be in physical contact with each other.

e. Replacement windows, if installed, shall be ENERGY STAR labeled (Contact NCHFA is E-Star is unavailable). At a minimum, replacement windows shall be insulated, double pane, U-factor of 0.35 or below and a SHGC of 0.30.

## 4. Foundation – Crawl Space and Basement

When made easily accessible by rehabilitation and when applicable or when a related building component is replaced it shall be replaced according to this standard:

a. There shall be a continuous, durable air barrier enclosing the conditioned space.
b. Air sealing shall be required at the subfloor - All penetrations between conditioned and unconditioned space shall be sealed.
c. Insulation shall be installed and/or fixed in floors to manufacturer specifications with no gaps, voids, or compression.
d. For vented crawls, floors must be insulated to meet code. For closed crawl spaces, foundation wall or floors shall be insulated to code.
e. Insulation and the subfloor shall be installed and/or fixed to be in physical contact with each other.
f. All crawl spaces shall have a 100 percent ground cover as required by the NC building code.
g. Buildings with crawl spaces that show signs of standing water shall not be included in the program unless drainage is a part of the scope of work.

## 5. Heating & Cooling – Equipment & Ductwork

When made easily accessible by other rehabilitation or when a related building component is replaced it shall be replaced according to this standard:

a. All accessible duct connections shall be sealed with a UL-listed bucket mastic product.
b. All uninsulated ductwork outside the conditioned envelope shall be insulated to R-8.
c. Replacement heating and cooling systems shall be rated at or above the following efficiencies:

| | |
|---|---|
| Furnace | At least 90% |
| AC (w/furnace) | At least 15 SEER |
| Heat Pumps | At least 15 EER/8.8 HSPF |

## 6. Lighting and Appliances

a. All light fixtures shall utilize fluorescent lamps (CFLs), light emitting diodes (LEDs) or Pin bulbs.
b. Appliances (e.g. refrigerator, dishwasher, clothes washer), if installed, shall be ENERGY STAR labeled.
c. New water heaters shall have a Minimum UEF as indicated in the table:

| Water Heater Type | Minimum UEF Value |
|---|---|
| Electric Tank | .93 |

| | |
|---|---|
| Gas Tank | .60 |
| Gas Tankless | .61 |
| Heat Pump | Any |

## 7. Combustion Safety

a. If existing gas equipment will remain atmospherically vented and scope of work includes air-sealing of the building envelope, BPI protocol or other combustion safety testing protocol must be completed to verify appliances are not backdrafting into the building.

b. Buildings containing vent-free gas logs or gas/kerosene space heaters shall not be retrofitted until units are permanently removed.

c. 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.

d. If any gas appliances remain inside the building envelope, one carbon monoxide (CO) detector shall be installed outside of each bedroom or sleeping area and according to manufacturer specifications.

## Stretch Goals for Projects

When feasible and cost appropriate, projects should consider the following design inclusions based on tenant needs and fit for the project:

a. Consider ceiling fans in all bedrooms and have a switch for operation of light and fan assembly separately.
b. Install raceways for wires in areas where tenants may need to run a wire in areas where technological hardware may be used. Additionally, consider outlets with USB adaptors built in. Would a workstation and foldable work surface/desk increase opportunities to study or work from home?
c. Consider a fully electric project and eliminate combustion appliances (no carbon monoxide generation).
d. Consider over-insulation on the attic plane which may require intentional design of trusses to allow for more.
e. Consider over-insulation in the wall assemblies by increasing the dimensions of walls or adding rigid foam to a traditional 2”x4” framed wall.
f. Explore local sustainability targets for projects if applicable in your area.
g. Consider attaining HERO code certification for energy efficiency (may not be applicable if new codes go into effect).
h. Explore the DSIRE website for a list of energy-based incentives your project may be eligible for.
i. Consider eliminating all step entries (even on non-accessible units) and incorporating universal design features throughout the project.
j. When planning the site, include walkability and bike-ability into your plan to reduce dependence on motorized transportation.
k. Consider whether community garden features or the inclusion of fruit-bearing trees and shrubs on site would be of a benefit to your tenants.
l. Consider whether a private office with telehealth capabilities might increase your clients access to healthcare.