

Energy Star Version 3.0

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FRONTIER

NeighborWorks®
HomeOwnership Center

NeighborWorks®
CHARTERED MEMBER



Building homes. Fulfilling dreams. Every day.

What is Energy Efficiency?

The process of doing more with less!



=

MORE
Doing
LESS
with

What is Energy Star?

Energy Star is a United States government program created in 1992 by the US Environmental Protection Agency in an attempt to reduce energy consumption and greenhouse gas emission by power plants. What began originally as a voluntary labeling program has grown in to one of the largest efforts worldwide to promote energy efficient consumer products



Why should a builder become an Energy Star Partner?

- ✓ Use energy efficiency to enhance your credibility
- ✓ Increase visibility
- ✓ Gain access to new customers
- ✓ Utilize a proven strategy
- ✓ Earn recognition for your success in improving the customers energy efficiency
- ✓ Environmental Impact
- ✓ Good Building Practice
- ✓ Understand Building Science

Energy Star for Homes Version 3.0

2 - Paths to certify a home to earn Energy Star

Prescriptive Path - is based on a predefined package of improvements

Performance Path - is based on a customized package of upgrades.

The National Program Requirements define the core energy efficiency specifications for both the Prescriptive and Performance Paths

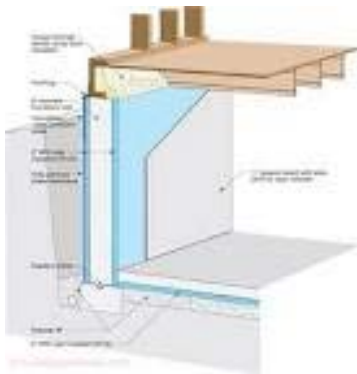
Reference:

www.energystar.gov

Best Practices for Energy Efficiency

What has to be Considered:

- ✓ Climate Zone
- ✓ Foundation
- ✓ Envelope Construction (Building Practices, Air Sealing, Windows, Doors & Insulation)
- ✓ Conditioned Space (Foundation, Walls & Roof)
- ✓ Air Sealing
- ✓ Heating / Cooling Equipment
- ✓ Thermostat & Duct Work
- ✓ Water Heater
- ✓ Lighting & Appliances
- ✓ Inspection & Verification



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Conditioned Crawl Space



Envelope Sealing on the Interior & Exterior of the Building Shell

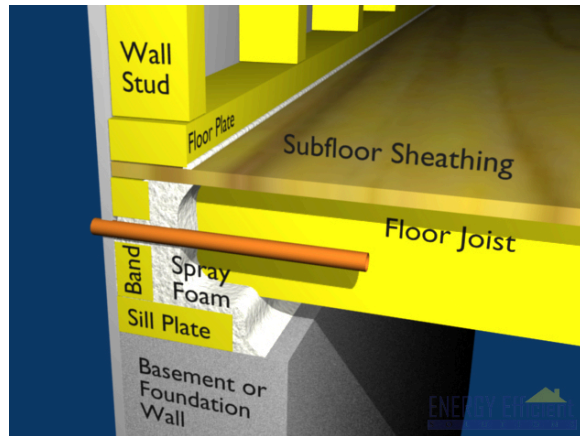


More Stringent Requirements for insulation installations and type requirements



Envelope Air Sealing

Sealing and insulating the "envelope" or "shell" of your home — its outer walls, ceiling, windows, doors, and floors — is often the most cost effective way to improve energy efficiency and comfort.



Air Seal....

- ✓ Band/Rim Joist
- ✓ Base Plate to Subfloor Sheathing
- ✓ Studs to Exterior Wall Sheathing
- ✓ Where more than 1 stud is fastened together
- ✓ Around Headers
- ✓ Around Doors, Windows
- ✓ Floor Registers
- ✓ Perimeter of Drywall (before it is finished)
- ✓ Recessed Light Penetrations



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All windows and doors are energy star qualified

- ✓ Look for the energy star partner sticker
- ✓ U- Values & SHGC

WHAT MAKES A DOOR ENERGY EFFICIENT?

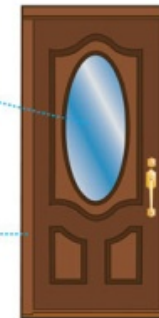


MULTIPLE GLASS PANES

Double or triple-paneled insulating glass is used to reduce heat flow.

IMPROVED CORE MATERIALS

Fiberglass, wood cladding, and steel with polyurethane foam core are among the most energy-efficient door materials available today.



TIGHTER FIT AND IMPROVED WEATHER STRIPPING

New frames may include a magnetic strip to create a tighter seal that reduces air leakage around the edges.

WHAT MAKES A WINDOW ENERGY-EFFICIENT?



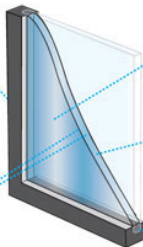
Today, manufacturers use an array of technologies to make ENERGY STAR qualified windows.

QUALITY FRAME MATERIALS

A variety of durable, low-maintenance framing materials reduce heat transfer and help insulate better.

MULTIPLE PANES

Two panes of glass, with an air- or gas-filled space in the middle, insulate much better than a single pane of glass. Some ENERGY STAR qualified windows include three or more panes for even greater energy efficiency, increased impact resistance, and sound insulation.



LOW-E GLASS

Special coatings reflect infrared light, keeping heat inside in winter and outside in summer. They also reflect damaging ultraviolet light, which helps protect interior furnishings from fading.

GAS FILLS

Some energy-efficient windows have argon, krypton, or other gases between the panes. These odorless, colorless, non-toxic gases insulate better than regular air.

WARM EDGE SPACERS

A spacer keeps a window's glass panes the correct distance apart. Non-metallic and metal/non-metal hybrid spacers also insulate pane edges, reducing heat transfer through the window.

Windows

Climate Zone	U-Factor ¹	SHGC ²	
Northern	≤ 0.30	Any	Prescriptive
	≤ 0.31	≥ 0.35	Equivalent Energy Performance
	≤ 0.32	≥ 0.40	
North-Central	≤ 0.32	≤ 0.40	
South-Central	≤ 0.35	≤ 0.30	
Southern	≤ 0.60	≤ 0.27	

Skylights

Climate Zone	U-Factor ¹	SHGC ²
Northern	≤ 0.55	Any
North-Central	≤ 0.55	≤ 0.40
South-Central	≤ 0.57	≤ 0.30
Southern	≤ 0.70	≤ 0.30

¹ Btu/h·ft²·°F

² Fraction of incident solar radiation

HVAC

Sealing and insulating the "envelope" or "shell" of your home — its outer walls, ceiling, windows, doors, and floors — is often the most cost effective way to improve energy efficiency and comfort.

Sizing HVAC Equipment is a necessity to the functionality of the building. Over sizing or under sizing of HVAC systems has serious consequences when looking at the building science.

HVAC System Quality Installation Contractor Checklist V 3.0 Requirement

Cooling Equipment: (Example)

Climate Zone 4

Condenser Manufacturer: Lennox

Listed Efficiency: 13.7 EER (Energy Efficiency Ratio of Cooling Cap.)
16.2 SEER (Seasonal Energy Efficiency Rating)

Heating Equipment: (Example)

Climate Zone 4

Condenser Manufacturer: Lennox

Listed Efficiency: 9.0 HSPF (Heating Seasonal Performance Factor)

Duct Work (Example)

Tape & Mastic All Connections

Ducts – R-8 Flex & Rectangular



Ductwork

- ✓ Supply duct work in unconditioned attics shall have insulation $\geq R-8$; all other ducts in unconditioned space shall have an insulation $\geq R-6$
- ✓ Total duct leakage shall be ≤ 8 CFM 25 per 100 square feet of conditioned floor area
- ✓ Duct leakage shall be ≤ 4 CFM 25 per 100 square feet of conditioned floor area



- ✓ Mastic all Ducts (Supply & Returns) & Connections
- ✓ Mastic @ registers where they penetrate subfloor
- ✓ Wrap all exhaust ducts either through wall or through roof



Thermostat

A programmable thermostat helps make it easy for you to save by offering four pre-programmed settings to regulate your home's temperature in both summer and winter - when you are home, asleep, or away.

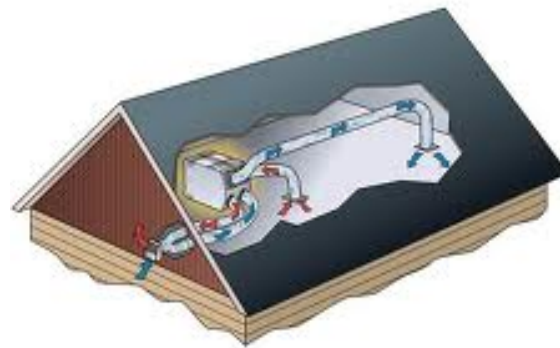
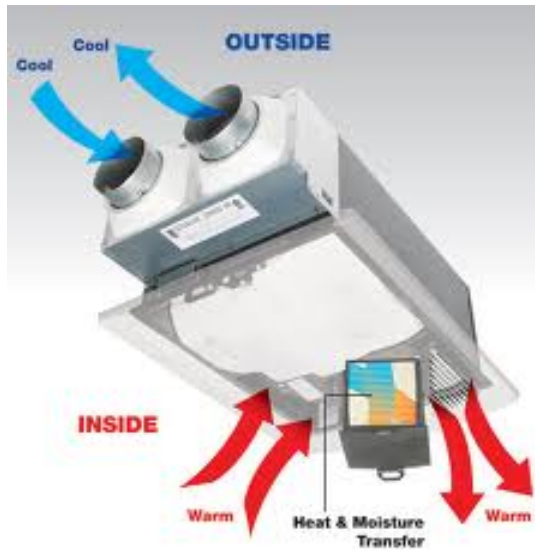


When using a programmable thermostat with a heat pump system ensure that the thermostat has “adaptive recovery”

Adaptive Recovery – This is the preferred recovery type for maximum energy savings. It starts the system ahead of the programmed time , and completes the recovery at the programmed time, taking into account changes in outdoor temperature during the season. There are several types of Adaptive or Intelligent Recovery designs on the market, each using feedback information from previous recoveries or other calculations to determine the next initiation time. Some are totally adaptive and some are partially adaptive. Continuous running of the equipment during recovery eliminates the user complaint that cycling of the system during recovery is annoying during sleep hours. Adaptive Recovery should be the default or preferred type.

Mechanical Ventilation

When 68% or less of the homes natural air does not circulated within the hour then natural ventilation is required.



Attic Installation Diagram

Water Heater



GeoSpring Hybrid Water Heater



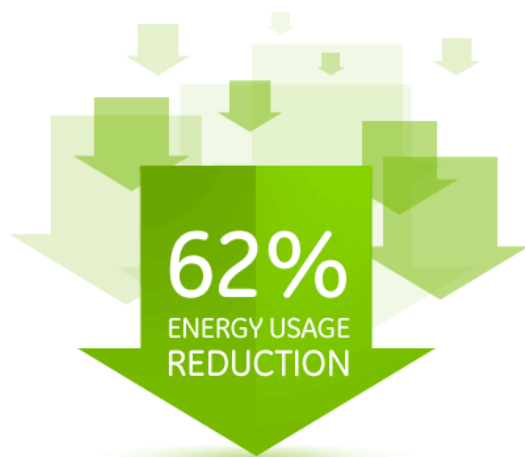
GE Hybrid



Rheem Marathon

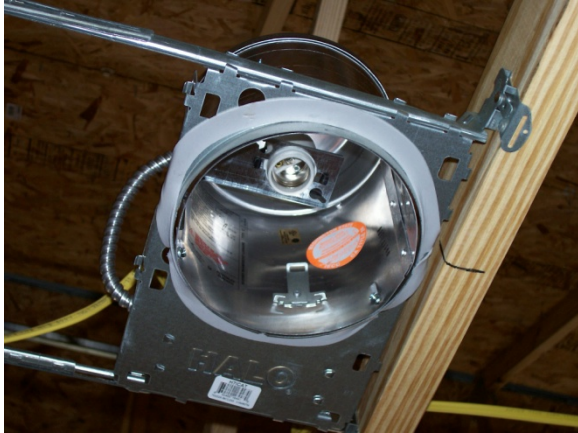
Electric Water Heater Requirements:

Gas :	40 Gal. 0.61 EF	50 Gal. 0.59 EF
Electric:	40 Gal. 0.93 EF	50 Gal. 0.92 EF

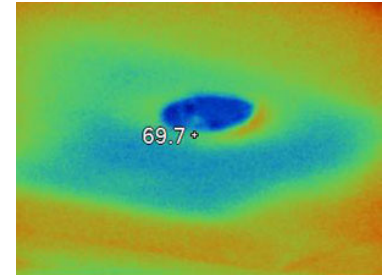


Lighting

Energy Star qualified light bulbs or fixtures shall be installed in 80% of RESNET-defined Qualifying Light Fixture Locations.



Air Tight Can Lights



CFL's



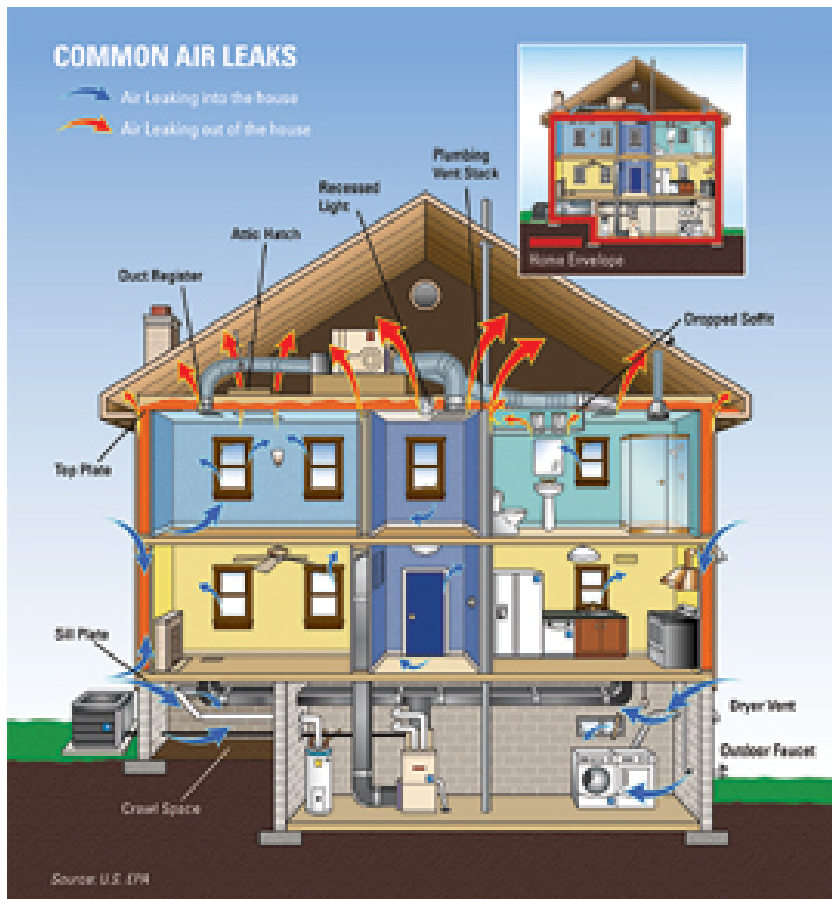
Appliances

Where refrigerators, dishwashers, ceiling fans or exhaust fans are installed products shall be energy star qualified.



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Building science is the collection of scientific knowledge that focuses on the analysis and control of the physical phenomena affecting buildings. It traditionally includes the detailed analysis of [building materials](#) and [building envelope](#) systems. In Europe, building physics is a term used for the knowledge domain that overlaps heavily with building science, and includes fire protection, sound control, and day lighting as well as the heat and moisture concerns that tend to dominate North American building science. The practical purpose of building science is to provide predictive capability to optimize [building performance](#) and understand or prevent building failures.



Field Verification

In an ENERGY STAR qualified home...

The builder's construction crews know that their work will be tested for performance, quality, and attention to detail. Home Energy Raters inspect insulation installation, perform tightness tests on the home's envelope and duct system, and ensure that all energy-efficient features and equipment are properly installed in your new home.



Energy Star V 3.0

Required Checklist

Water Management System Builder Checklist



ENERGY STAR Qualified Homes, Version 3 (Rev. 04) Water Management System Builder Checklist^{1,2,3}

Home Address: _____	City: _____	State: _____		
Inspection Guidelines	Must Correct	Builder Verified	Rater Verified	N/A
1. Water-Managed Site and Foundation				
1.1 Patio slabs, porch slabs, walks, and driveways sloped ≥ 0.25 in. per ft. away from home to edge of surface or 10 ft., whichever is less. ⁴	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2 Back-fill has been tamped and final grade sloped ≥ 0.5 in. per ft. away from home for ≥ 10 ft. See footnote for alternatives. ⁴	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3 Capillary break beneath all slabs (e.g., slab on grade, basement slab) except crawlspace slabs using either: ≥ 6 mil polyethylene sheeting, lapped 6-12 in., or ≥ 1 " extruded polystyrene insulation with taped joints. ⁵	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4 Capillary break at all crawlspace floors using ≥ 6 mil polyethylene sheeting, lapped 6-12 in., and installed using one of the following three options: ⁵				
1.4.1 Placed beneath a concrete slab; OR,	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4.2 Lapped up each wall or pier and fastened with furring strips or equivalent; OR,	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4.3 Secured in the ground at the perimeter using stakes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5 Exterior surface of below-grade walls finished as follows: • For poured concrete, concrete masonry, and insulated concrete forms, finish with damp-proofing coating • For wood framed walls, finish with polyethylene and adhesive or other equivalent waterproofing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.6 Class 1 vapor retarders not installed on the interior side of air permeable insulation in exterior below-grade walls. ⁶	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.7 Sump pump covers mechanically attached with full gasket seal or equivalent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8 Drain tile surrounded with clean gravel and fabric filter. ⁷	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Water-Managed Wall Assembly				
2.1 Flashing at bottom of exterior walls with weep holes included for masonry veneer and weep screed for stucco cladding systems, or equivalent drainage system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.2 Fully sealed continuous drainage plane behind exterior cladding that laps over flashing in Item 2.1. Additional bond-break drainage plane layer provided behind all stucco and non-structural masonry cladding wall assemblies. ⁸	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.3 Window and door openings fully flashed. ⁹	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Water-Managed Roof Assembly				
3.1 Step and kick-out flashing at all roof-wall intersections, extending ≥ 4 " on wall surface above roof deck and integrated with drainage plane above. ¹⁰	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.2 For homes that don't have a slab-on-grade foundation and do have expansive or collapsible soils, gutters & downspouts provided that empty to lateral piping that deposits water on sloping final grade ≥ 5 ft. from foundation or to underground catchment system ≥ 10 ft. from foundation. ¹¹	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.3 Self-sealing bituminous membrane or equivalent at all valleys & roof deck penetrations. ¹²	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4 In 2009 IECC Climate Zones 5 and higher, self-sealing bituminous membrane or equivalent over sheathing at eaves from the edge of the roof line to > 2 ft. up roof deck from the interior plane of the exterior wall. ¹²	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Water-Managed Building Materials				
4.1 Wall-to-wall carpet <i>not</i> installed within 2.5 feet of toilets, tubs, and showers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.2 Cement board or equivalent moisture-resistant backing material installed on all walls behind tub and shower enclosures composed of tile or panel assemblies with caulked joints. Paper-faced backerboard shall not be used. ¹³	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.3 In Warm-Humid climates, Class 1 vapor retarders not installed on the interior side of air permeable insulation in above-grade walls, except at shower and tub walls. ¹⁴	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.4 Building materials with visible signs of water damage or mold <i>not</i> installed. ¹⁴	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.5 Interior walls <i>not</i> enclosed (e.g., with drywall) if either the framing members or insulation products have high moisture content. ¹⁵	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Builder Employee: _____				
Builder Signature: _____		Date: _____		
Builder has completed Builder Checklist in its entirety, except for items that are checked in the Rater Verified column (if any). ²				
Rater Signature: _____		Date: _____		

Energy Star V 3.0

Required Checklist

Water Management System Builder Checklist



ENERGY STAR Qualified Homes, Version 3 (Rev. 04) HVAC System Quality Installation Contractor Checklist ¹

Home Address: _____ City: _____ State: _____

System Description ² _____ Cooling system for temporary occupant load? ³ Yes ☐ No ☐

1. Whole-Building Mechanical Ventilation Design ⁴

	Cont./Tech. Verified	Kater Verified	N/A
1.1 Ventilation system installed that has been designed to meet ASHRAE 62.2-2010 requirements including, but not limited to, requirements in items 1.2-1.5. ⁴	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1.2 Ventilation system does not utilize an intake duct to the return side of the HVAC system unless the system is designed to operate intermittently and automatically based on a timer and to restrict outdoor air intake when not in use (e.g., motorized damper).	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1.3 Documentation is attached with ventilation system type, location, design rate, and frequency and duration of each ventilation cycle.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1.4 If present, continuously-operating vent. & exhaust fans designed to operate during all occupiable hours.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1.5 If present, intermittently-operating whole-house ventilation system designed to automatically operate at least once per day and at least 10% of every 24 hours.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

2. Heating & Cooling System Design ^{5, 6}

⁵ - Parameters used in the design calculations shall reflect home to be built, specifically: outdoor design temperatures, home orientation, number of bedrooms, conditioned floor area, window area, predominant window performance and insulation levels, infiltration rate, mechanical ventilation rate, presence of MERV 15 or better filter, and indoor temperature setpoints = 70°F for heating; 75°F for cooling.

2.1 Heat Loss / Gain Method: ☒ Manual J v8 ☐ ASHRAE 2009 ☐ Other: _____

2.2 Duct Design Method: ☒ Manual D ☐ Other: _____

2.3 Equipment Selection Method: ☐ Manual S ☒ OEM Rec. ☐ Other: _____

2.4 Outdoor Design Temperatures: ⁸ Location: LSX 1%: 39°F 99%: 10°F

2.5 Orientation of Rated Home (e.g., North, South): W

2.6 Number of Occupants Served by System: 5

2.7 Conditioned Floor Area in Rated Home: 1000 Sq. Ft.

2.8 Window Area in Rated Home: 104 Sq. Ft.

2.9 Predominant Window SHGC in Rated Home: ¹⁰ .20

2.10 Infiltration Rate in Rated Home: ¹¹ Summer: 13 Winter: 16

2.11 Mechanical Ventilation Rate in Rated Home: _____ CFM

2.12 Design Latent Heat Gain: 5600 BTUh

2.13 Design Sensible Heat Gain: 9700 BTUh

2.14 Design Total Heat Gain: 15,261 BTUh

2.15 Design Total Heat Loss: 18,874 BTUh

2.16 Design Airflow: ¹² 800 CFM

2.17 Design Duct Static Pressure: ¹³ 0.08 Inches Water Column (IWC)

2.18 Full Load Calculations Report Attached ☒

3. Selected Cooling Equipment, If Cooling Equipment to be Installed

3.1 Condenser Manufacturer & Model: LENNS N40-224-18

3.2 Condenser Serial #: 1911m17084

3.3 Evaporator / Fan Coil Manufacturer & Model: LENNS CBX22UH-024-230-02

3.4 Evaporator / Fan Coil Serial #: 1612B06716

3.5 AHRI Reference #: ¹⁴ 5186808

3.6 Listed Efficiency: 13.2 EER 16.2 SEER

3.7 Metering Device Type: ☒ BTV ☐ Fixed orifice ☐ Other: _____

3.8 Refrigerant Type: R-410a ☐ Other: _____

3.9 Fan Speed Type ¹⁵ ☐ Fixed ☒ Variable (ECM / JCM) ☐ Other: _____

3.10 Listed Sys. Latent Capacity at Design Cond. ¹⁶ 9472 BTUh

3.11 Listed Sys. Sensible Capacity at Design Cond. ¹⁶ 16,117 BTUh

3.12 Listed Sys. Total Capacity at Design Cond. ¹⁶ 25,200 BTUh

3.13 If Listed Sys. Latent Capacity (Value 3.10) < Design Latent Heat Gain (Value 2.12), ENERGY STAR qualified dehumidifier installed

3.14 Listed Total Cap. (Value 3.12) is 95-115% of Design Total Heat Gain (Value 2.14) or next nom. Size ¹⁷ ☒

3.15 AHRI Certificate Attached ¹⁸ ☒

4. Selected Heat Pump Equipment, If Heatpump to be Installed

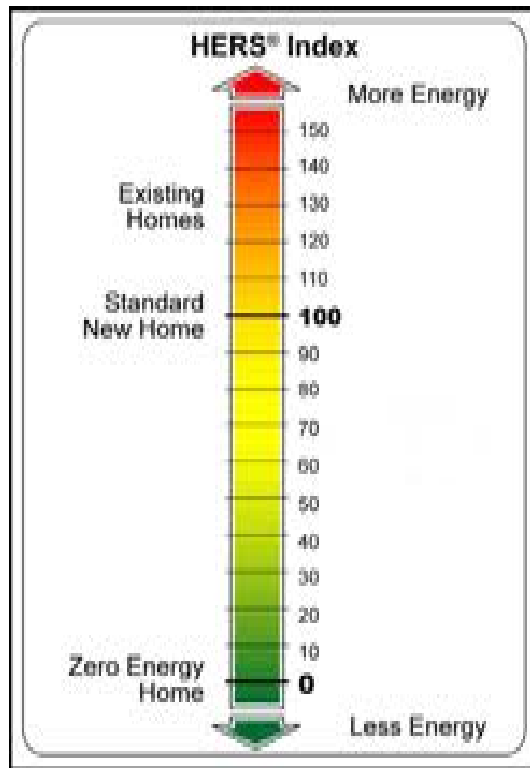
4.1 AHRI Listed Efficiency: 7 HSPF

4.2 Performance at 17°F: Capacity 13,260 BTUh Efficiency 264 COP

4.3 Performance at 47°F: Capacity 21,860 BTUh Efficiency 318 COP

Energy Star V 3.0

HERS
Home Energy Rating System



This sticker should be located on the inside of the panel box cover for all energy star qualified homes.

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Cost Comparison

Typical Code Built House 2012

3BR, 2 Bath, 1380 Gross Sq. Feet, Morehead, KY

Process

Foundation

Framing

Insulation

Air Sealing

Electrical

HVAC

Plumbing

Drywall

Interior Finish

(I.E: Paint, Cabinets, Floor Coverings)

Exterior Finish

(I.E.: Roofing, Siding, Conc. Etc.)

Misc.

Total Construction Cost \$103,500.00

Energy Star V 3.0 Energy Star House Built in 2012

3BR, 2 Bath, 1380 Gross Sq. Feet, Morehead, KY

Process

Additional Cost

Foundation..... \$1,875.00

Framing..... \$495.00

Insulation..... \$2,170.00

Air Sealing..... \$651.00

Electrical..... \$0.00

HVAC \$1,870.00

Plumbing..... \$450.00

Drywall \$350.00

Interior Finish..... \$0.00

(I.E: Paint, Cabinets, Floor Coverings)

Exterior Finish..... \$0.00

(I.E.: Roofing, Siding, Conc. Etc.)

Misc. \$0.00

Total Construction Cost \$103,500.00

Additional Energy Star Cost \$7,861.00

Total Cost \$111,361.00

Elec. Per Month (Avg.)

\$ 148.53

Not Energy Star

No HERS

Elec. Per Month (Avg.)

\$ 66.94

Energy Star Qualified

HERS Score: 68

Savings: \$81.59/month

8.02 Year Payback for All Improvements



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Questions?



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