



U.S. DOE Zero Energy Ready Home Manufactured Homes National Program Requirements, Version 1

Eligibility Requirements

Only manufactured homes¹ are eligible to be certified through the U.S. DOE Zero Energy Ready Home (ZERH) Manufactured Homes Pilot Program. To participate in the DOE ZERH program, manufactured homes must be certified under the ENERGY STAR Manufactured New Homes program. Site-built and modular single-family homes and multifamily buildings may not earn the DOE ZERH Manufactured Homes Certification but may be eligible for certification through applicable DOE ZERH Program requirements. For more information, visit <https://www.energy.gov/eere/buildings/doe-zero-energy-ready-home-zerh-program-requirements>

Partnership and Plant Certification Requirements

Manufactured housing plants must meet the following requirements prior to certifying homes to the DOE ZERH program:

- Register as a DOE ZERH Manufactured Home Plant Partner
- Complete a plant certification process through a recognized Quality Assurance Provider (QA Provider).² If a plant is de-certified by its QA Provider for any reason, it may not produce DOE ZERH certified manufactured homes and must immediately cease all use of the DOE ZERH name and logo.
- See the **DOE Zero Energy Ready Home Manufactured Homes Version 1: Certification, Enforcement, and Reporting Guide** for a complete description of certification and verification process requirements.

Manufactured Homes Certification Requirements³

All Certified DOE ZERH Manufactured Homes shall meet the following requirements:

- Exhibit 1: Mandatory Efficiency Requirements
- Exhibit 2: Additional Efficiency Requirements
- Exhibit 3: Mandatory Technical Requirements

Exhibit 1: Mandatory Efficiency Requirements

Climate Zone ⁴	1	2	3
Envelope & Glazing			
<ul style="list-style-type: none"> • Insulation and glazing U-factor levels shall comply with one of the following options: <ul style="list-style-type: none"> • Meet or exceed the following performance levels: 			
Wall Insulation	R-13	R-21	R-21
Floor Insulation	R-22	R-22	R-33
Ceiling Insulation	R-33	R-33	R-38
Door U-factor	0.40	0.40	0.30
Window U-factor	0.30	0.30	0.30
<ul style="list-style-type: none"> • OR achieve an overall coefficient of heat transmission ⁵ (U_o) that does not exceed: 			
Single-section U _o	0.076	0.065	0.057
Multi-section U _o	0.070	0.063	0.054
<ul style="list-style-type: none"> • The solar heat gain coefficient of fenestration shall not exceed: ⁶ 			
SHGC	0.25	0.25	N/A
Thermostat & Ductwork			
<ul style="list-style-type: none"> • Programmable thermostat shall be installed. • Ducts in floor cavities shall be enclosed by floor insulation. • Crossover ducts, ducts in unconditioned attics, and other ducts in unconditioned space shall have at least R-8 duct insulation⁷ 			
Mandatory Setup Requirements			
<ul style="list-style-type: none"> • Marriage line seal: For multi-section homes only, the marriage line areas must be filled with a continuous, non-porous insulating gasket creating a permanent air barrier in the ceiling, walls, and floor. Acceptable gaskets can be one- or two-part systems, including proprietary gaskets, foams, insulation wrapped in poly and insulation covered by butyl or other long-life tape on one side. There should be no visible gaps or tears. The marriage line seal shall be installed at the plant and be protected against damage during shipping. • Duct Installation: For multi-section homes only, the crossover ducts must be installed such that all seams and joints are tightly sealed against leakage and the ducts do not rest on the ground. 			



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Exhibit 2: Additional Efficiency Requirements

In addition to meeting the requirements in Exhibit 1, select one or more energy efficiency measure(s) to achieve a total of at least 18 (eighteen) points. Select from the applicable section based on the primary space heating system of the home to be certified. The second row represents the point value for mandatory measures from Exhibit 1, which may be counted towards the required total.

Energy Efficiency Measure	Point Value ⁸		
	CZ 1	CZ 2	CZ 3
Mandatory Requirements			
Certified ENERGY STAR Manufactured New Homes Version 3			
All Requirements in Exhibit 1	7.5	2.5	2
Optional Envelope Improvements			
Coefficient of heat transmission (U_o) ≤ 0.049 ⁶	12	9.5	4.5
Optional Heating and Cooling Equipment			
Heat Pump ⁹ ≥ 7.5 HSPF2 / 14.3 SEER2	9	13.5	17
Gas / propane Furnace ≥ 90 AFUE	2	2.5	5.5
Gas / propane Furnace ≥ 95 AFUE	2.5	3.5	7.5
Gas / Propane Furnace ≥ 96 AFUE	3	4	8.5
Optional Water Heater			
Gas / Propane Water Heater ≥ 0.93 UEF.	4.5	3.5	0.5
Heat Pump Water Heater ≥ 2.20 UEF	With electric furnace, electric strip, or electric baseboard primary space heating	6	1.5
Heat Pump Water Heater ≥ 3.30 UEF		7.5	1.5
Heat Pump Water Heater ≥ 2.20 UEF	With all other primary heating sources	9	7.5
Heat Pump Water Heater ≥ 3.30 UEF		11.5	9
Optional Lighting, Appliances, & Water Fixtures			
LED lighting installed in all permanently installed fixtures ¹⁰	0.5	0.5	0.5
Bathroom faucets ≤ 1.5 gallons per minute (gpm) and showerheads ≤ 2.0 gpm	0.5	0.5	0.5
ENERGY STAR certified refrigerator and dishwasher ¹¹	0.5	0.5	0.5
ENERGY STAR certified clothes washer ¹¹	0.5	0.5	0.5



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Exhibit 3: Mandatory Technical Requirements

In addition to meeting the requirements in Exhibits 1 and 2, all requirements in Exhibit 3 must be met, including Factory Installed Measures and Field Installed Measures.

FACTORY INSTALLED MEASURES				
THERMAL ENVELOPE				
Measure	Technical Requirement	Documentation	Verification	Frequency
1 Reduced Thermal Bridging				
1.1 Roof truss heel height	For insulated ceilings with attic space above (i.e., non-cathedralized), the minimum roof truss heel height is 5.5 in.	Design Approval Primary Inspection Agency (DAPIA) / Quality Control Manual (QCM)	In-Plant Primary Inspection Agency (IPIA)	IPIA inspection
1.2 Insulation beneath attic platforms	Insulation beneath attic platforms (e.g., HVAC platforms, walkways) must be $\geq R-21$.	DAPIA/QCM	IPIA	IPIA inspection
1.3 Reduced wall thermal bridging	At above-grade walls separating conditioned from unconditioned space, one of the following options used (rim / band joists exempted): Option 1: Advanced framing ¹² Option 2: Extended plate and beam wall system. Option 3: Continuous rigid insulation, insulated siding, or combination of the two is: $\geq R-3$ in HUD climate zone 1 and 2; $\geq R-5$ in HUD climate zone 3.	DAPIA/QCM	IPIA	IPIA inspection
2 Air Sealing				
2.1 Sealing recessed lighting	Recessed lighting fixtures adjacent to unconditioned space must be ICAT (Insulation Contact Airtight) labeled and gasketed.	DAPIA/QCM	IPIA	IPIA inspection
2.2 Sealing exterior doors	Doors adjacent to unconditioned space (e.g., attics, garages, basements) or ambient conditions must be made substantially air-tight with weatherstripping or equivalent gasket.	DAPIA/QCM	IPIA	IPIA inspection
2.3 Sealing floor penetrations	All plumbing, electrical, and HVAC penetrations through the floor must be sealed at the floor, even where the floor is not serving as the air barrier.	DAPIA/QCM	IPIA	IPIA inspection



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2.4 Sealing bottom board or belly board	In any installation where the bottom board or belly board is used as part of the air barrier, the perimeter and any seams in the bottom board or belly board must be sealed with caulk, foam, tape, gasket, or equivalent air sealing material.	DAPIA/QCM	IPIA	IPIA inspection
HVAC/AIR DISTRIBUTION SYSTEMS				
Measure	Technical Requirement	Documentation	Verification	Frequency
3 Mechanical Ventilation System Design				
3.1 Ventilation air flow rate	Mechanical ventilation airflow design rate and run-time meet the requirements of ASHRAE 62.2-2010, 2013, 2016, 2019 or 2022. A POS system can be installed but does not count toward meeting the requirement.	DAPIA/QCM	IPIA	IPIA inspection
3.2 Ventilation control	System has controls that allow automatic operation.	DAPIA/QCM	IPIA	IPIA inspection
3.3 Ventilation inlet	For outdoor air inlets designed to connect to a ducted HVAC system return, damper controls are provided that allow the airflow automatically to be restricted during ventilation off-cycle. (One option is the use of a spring-loaded backdraft damper that closes the inlet when the furnace fan is off.)	DAPIA/QCM	IPIA	IPIA inspection
3.4 Whole house ventilation fan sound level	Whole house ventilation fans must have a sound rating of ≤ 3 sones if operated intermittently and ≤ 1 sone if continuous. Fans used with HRVs or ERVs and in-line remote mounted fans are exempt from this requirement.	DAPIA/QCM	IPIA	IPIA inspection
3.5 Integrated vent controller	If the ventilation system controller operates the HVAC fan, then HVAC fan operation is intermittent and either the fan type for the air handler fan must be an ECM / ICM type or the controls set to reduce run-time by accounting for HVAC system heating or cooling hours.	DAPIA/QCM	IPIA	IPIA inspection
3.6 Bathroom ventilation fans	Bathroom fans, except HRV (Heat Recovery Ventilator) or ERV (Energy Recovery Ventilator) fans, must be ENERGY STAR certified.	DAPIA/QCM	IPIA	IPIA inspection
4 Duct Quality Installation				



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4.1 Air handler location	<p>The HVAC air handler must be located within the home’s thermal boundary and air barrier. Outdoor package units are exempt from this requirement (see item 2.1 in the 2% Field Inspection Technical Requirement).</p>	DAPIA/QCM	IPIA	IPIA inspection
4.2 Duct installation quality	<p>Factory-installed ductwork must be installed without kinks, sharp bends, compressions, or excessive coiled flexible ductwork.</p>	DAPIA/QCM	IPIA	IPIA inspection
4.3 Measured duct leakage	<p>Leakage of factory-installed ducts must not exceed four (4) cubic feet per minute per 100 sq. ft. of conditioned floor area at a pressure differential of 0.1-inch w.g. (25 Pascals).</p>	DAPIA/QCM	In-plant inspection and testing by trained plant personnel (INSP)	10%
5 Local Mechanical Exhaust				
5.1 Kitchen exhaust airflow rate	<p>For intermittently-operated fans (such as range hoods): airflow must achieve ≥ 100 CFM, and, if not integrated with range, the fan must achieve ≥ 5 ACH (Air Changes per Hour) based on kitchen volume.</p> <p>For continuously-operated fans: airflow must achieve ≥ 5 ACH based on kitchen volume with a minimum of 25 CFM.</p> <p>Kitchen volume shall be determined by drawing the smallest possible rectangle on the floor plan that encompasses all cabinets, pantries, islands, peninsulas, ranges / ovens, and the kitchen exhaust fan, and multiplying by the average ceiling height for this area. Cabinet volume shall be included in the kitchen volume.</p>	DAPIA/QCM	IPIA	IPIA inspection
5.2 Bath exhaust airflow rate and sound level	<p>For continuously-operated fans airflow must achieve ≥ 20 CFM and sound levels must be ≤ 1 sone.</p> <p>For intermittently-operated fans airflow must achieve ≥ 50 CFM and sound levels must be ≤ 3 sones.</p> <p>HRV and ERV fans are exempt from the sone requirement.</p>	DAPIA/QCM	IPIA	IPIA inspection
6 Air Filtration				



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6.1	Air filtration	Central forced-air HVAC system(s) must have minimum MERV 8 filters. Air handler must be protected from dust during home production/storage and transport.	DAPIA/QCM	IPIA	IPIA inspection
6.2	Sealing of the filter access panel	To prevent bypass, the filter access panel must include a gasket or comparable sealing mechanism and fit snugly against the exposed edge of filter when closed.	DAPIA/QCM	IPIA	IPIA inspection
6.3	All return air passes through filter	All return air and mechanically supplied outdoor air must pass through a filter prior to conditioning.	DAPIA/QCM	IPIA	IPIA inspection
7 Combustion Appliances					
7.1	Drafted or direct vented appliances	Furnaces, boilers, and water heaters located within the home's pressure boundary must be mechanically drafted or direct-vented.	DAPIA/QCM	IPIA	IPIA inspection
7.2	Other unvented combustion	No unvented combustion appliances other than cooking ranges or ovens are permitted.	DAPIA/QCM	IPIA	IPIA inspection
8 Air Circulation					
8.1	Ceiling fans	Ceiling fans must be ENERGY STAR certified.	DAPIA/QCM	IPIA	IPIA inspection
WATER EFFICIENCY AND WATER MANAGEMENT					
	Measure	Technical Requirement	Documentation	Verification	Frequency
9 Hot Water Distribution Efficiency, Water Fixtures					
9.1	DHW distribution efficiency and water fixtures	Meet one (1) of the following requirements: a. The hot water distribution system must store ≤ 0.5 gallons of water in any piping/manifold between the hot water source and any hot water fixture; OR, b. The hot water distribution system must store < 1.2 gallons of water in any piping/manifold between the hot water source and any hot water fixture AND maximum water fixture flow rates: bathroom faucets ≤ 1.5 gpm and showerheads ≤ 2.0 gpm.	DAPIA/QCM	IPIA	IPIA inspection
10 Water-Managed Building Assembly					
10.1	Flashed window/ door openings	Window and door openings fully flashed. ^{13 14 15}	DAPIA/QCM	IPIA	IPIA inspection



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10.2 Step and kick-out flashing	Install step and kick-out flashing at all roof-wall intersections. ¹⁶	DAPIA/QCM	IPIA	IPIA inspection
10.3 Bituminous membrane	Self-adhering polymer-modified bituminous membrane applied at all valleys, roof deck penetrations, and 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.	DAPIA/QCM	IPIA	IPIA inspection
11 Water-Managed Building Materials				
11.1 Building material integrity	Building materials with visible signs of water damage or mold must not be installed or allowed to remain in the home.	DAPIA/QCM	IPIA	IPIA inspection
11.2 Drain pan and backflow prevention	For each condensate-producing HVAC component, add a corrosion-resistant drain pan (e.g., galvanized steel, plastic) as permitted by the equipment manufacturer’s installation manual. The drain pan must drain to a conspicuous point of disposal in case of blockage. Backflow prevention valve included if connected to a shared drainage system.	DAPIA/QCM	IPIA	IPIA inspection
INDOOR AIR QUALITY				
Measure	Technical Requirement	Documentation	Verification	Frequency
12 Moisture Control				
12.1 Supply piping insulation	Piping must be placed on the conditioned side of the insulation.	DAPIA/QCM	IPIA	IPIA inspection
12.2 Hard-surface flooring	Hard-surface flooring must be applied in kitchens, baths, entry, laundry, and utility rooms.	DAPIA/QCM	IPIA	IPIA inspection
13 HVAC System				
13.1 Relative humidity level	Homes in HUD climate zone 1 must be “dehumidifier-ready”: Provide a location with power and a drain for future installation of a dehumidifier.	DAPIA/QCM	IPIA	IPIA inspection
13.2 Ductwork in cavities	No building cavities are to be used as air supplies or returns, including transfer vents, unless lined with sealed duct materials (e.g., sheet metal, duct board).	DAPIA/QCM	IPIA	IPIA inspection
13.3 Ozone generators	No ozone generators provided with the home.	DAPIA/QCM	IPIA	IPIA inspection
14 Materials				



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14.1 Low-emission carpet	At least 90 percent of carpet, carpet adhesives, and carpet cushion must be third-party certified as meeting the Carpet and Rug Institute (CRI) Green Label Plus testing program criteria.	DAPIA/QCM	IPIA	IPIA inspection
14.2 Low-emission wood product	Structural plywood and oriented strand board (OSB), must comply with PS1 or PS2, as appropriate, and made with moisture-resistant adhesives as indicated by “Exposure 1” or “Exterior” on the American Plywood Association (APA) trademark.	DAPIA/QCM	IPIA	IPIA inspection

15 Final (prior to home occupancy)

15.1 Dry and clean HVAC system	HVAC system and ductwork must be verified to be dry and clean AND new filter installed before shipping the home.	DAPIA/QCM	IPIA	IPIA inspection
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Renewable-Ready Features

Measure	Technical Requirement	Documentation	Verification	Frequency
16 PV-Ready				
16.1 Documentation	Include in the installation manual information about the location of PV breaker space and conduit for PV panels.	MIM	DAPIA	Every Home
16.2 Conduit to Inverter	Install a 1 in. electrical conduit, material as approved under the HUD Code, for wire run from the designated PV array location to the designated inverter location (cap and label both ends).	DAPIA/QCM	DAPIA	As per standard plant inspection protocol
16.3 Conduit to service panel	Install a 1 in. electrical conduit, material as approved under the HUD Code, from designated inverter location to electrical service panel (Cap and label both ends).	DAPIA/QCM	IPIA	As per standard plant inspection protocol
16.4 Circuit breaker slot requirement	Provide a labeled slot for a dual circuit pole breaker in the electrical service panel. Service panel must be sized and have space for a dual pole circuit breaker.	DAPIA/QCM	IPA	As per standard plant inspection protocol

Field Installed Measures

Measure	Technical Requirement	Documentation	Verification	Frequency
1 Envelope and Foundation System				
1.1 Radon mitigation	All the following radon-resistant features must be installed in homes in EPA Radon Zone 1 (see	Manufacturer’s installation Manual (MIM)	Field inspection by manufacturer’s representative	2%



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	<p>www.epa.gov/radon/zonemap.html), except where noted.¹⁷</p> <p>Homes with raised pier foundation are exempt from the radon mitigation requirement.</p>		(FIELD)	
1.2 Sealing common walls	In attached homes, gaps between units must be sealed at all exterior boundaries to form a continuous air barrier separating conditioned from unconditioned spaces.	MIM	FIELD	2%
2 HVAC and Electric System				
2.1 Outdoor packaged HVAC units	<p>Outdoor package units are allowed but such systems must:</p> <ul style="list-style-type: none"> a. be a heat pump; AND b. have outside duct runs that are less than 20 feet in length each for supply and return; and, have exterior ducts wrapped with \geq R-8 insulation. 	MIM	FIELD	2%
2.2 Garage HVAC equipment	Air-handling equipment or ductwork cannot be placed in a garage.	MIM	FIELD	2%
2.3 Ventilation before occupancy	<p>Home must be ventilated before occupancy.</p> <p>Ventilate the home with outside air at the highest rate and duration practical, meeting ventilation requirements for outdoor air flow and humidity control:</p> <p>During and shortly after installing products that are known sources of contaminants (e.g., cabinets, carpet padding and painting), AND</p> <p>During the period between finishing and occupancy.</p> <p>If whole house ventilation cannot be scheduled prior to occupancy, advise the buyer to operate the ventilation system at the highest rate it can provide during the first few months of occupancy, meeting the above requirements.</p>	MIM	FIELD	Every home
3 Water Management and Moisture Control				
3.1 For expansive or collapsible soils	For homes with a basement on expansive or collapsible soils, gutters and downspouts must be provided that empty to lateral piping that discharges water on sloping final grade \geq 5 ft. from foundation, or to underground catchment system not connected to the foundation drain system that discharges water \geq 10 ft. from foundation.	MIM	FIELD	2%
3.2 Capillary break beneath slabs	Provide capillary breaks beneath all slabs (e.g., slab on grade, basement	MIM	FIELD	2%



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	slab), except crawlspace slabs, using either: ≥ 6 mil polyethylene sheeting lapped 6-12 in., or ≥ 1 in. extruded polystyrene insulation with taped joints.			
3.3 Capillary break at crawlspace	Provide capillary break at crawlspace floors, except raised pier foundation, using ≥ 6 mil polyethylene sheeting lapped 6-12 in.	MIM	FIELD	2%
3.4 Below-grade walls and crawlspace	Exterior surface of below-grade walls of basements and unvented crawlspaces must be finished as follows: a. For poured concrete, masonry, and insulated concrete forms: finished with damp-proofing coating. b. For wood framed walls: finished with polyethylene and adhesive or other equivalent waterproofing.	MIM	FIELD	2%
3.5 Vapor retarder at below grade wall	Class 1 vapor retarder must not be installed on interior side of air permeable insulation in exterior below-grade walls.	MIM	FIELD	2%
3.6 Sump pump cover	Sump pump covers must be mechanically attached with full gasket seal or equivalent.	MIM	FIELD	2%
3.7 Drain tiles	Drain tiles must be installed at basement and crawlspace walls, with the top of the drain tile pipe below the bottom of the concrete slab or crawlspace floor.	MIM	FIELD	2%
3.8 Drain or sump pump and check valve	Drain or sump pump must be installed in basements and crawlspaces. In EPA Radon Zone 1 (see www.epa.gov/radon/zonemap.html), check valve also must be installed. Not required for raised pier foundation.	MIM	FIELD	2%
3.9 Below slab layer requirement	Layer of aggregate or sand (4 in.) with geotextile matting must be installed below slabs AND radon techniques must be used in EPA Radon Zone 1. Not required for raised pier foundation.	MIM	FIELD	2%
3.10 Sealed basements/crawlspaces	Basements/crawlspaces must be insulated, sealed, and conditioned. Not required for raised pier foundation.	MIM	FIELD	2%
3.11 Water splash damage protection	If gutters are not provided, homes must be protected from water splash damage using one of the below methods: a. Extend the foundation walls at least 16 in. above final grade; OR b. Provide a drip line at eaves that is horizontally 16 in. away from the edge of the foundation wall; OR	MIM	FIELD	2%



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	c. Use cladding materials that are decay and rot resistant and can tolerate regular wetting extending at least 16 in. above final grade and install a well-sealed, continuous drainage plane per manufacturer's instructions.			
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Footnotes:

1. A manufactured home is defined as a home built in a factory that is subject to the federal Manufactured Home Construction and Safety Standards (commonly referred to as the HUD Code) contained in 24 CFR 3280.
2. A recognized 'Quality Assurance Provider' (QA Provider) is an organization that supervises the third-party inspections required for plant certification, home labeling, and ongoing plant certification maintenance. The QA Provider may fulfill these responsibilities itself, or it may use qualified, independent, third-party consultants. Until DOE recognizes QA Providers for the DOE ZERH Program, DOE will recognize the use of EPA-recognized QA Providers. A list of recognized QA Providers can be found at www.energystar.gov/manufacturedhomes.
3. Certification of a manufactured home to meet DOE ZERH requirements is not intended to imply compliance with applicable codes. In cases where requirements of the federal codes or manufacturers' installation instructions overlap or conflict with DOE ZERH program requirements:
 - a. DOE ZERH requirements shall be met if they exceed the stringency of code requirements or installation instructions;
 - b. DOE ZERH requirements shall not be met if they conflict with code requirements or installation instructions. In such cases, the homes may not be certified unless the QA Provider has determined that no equivalent option is available that could meet the intent of the conflicting requirement.
4. Climate Zone boundaries as established by the Energy Conservation Standards for Manufactured Homes contained in 10 CFR 460. Climate Zone 1 consists of Alabama, Florida, Georgia, Hawaii, Louisiana, Mississippi, South Carolina, and Texas. Climate Zone 2 consists of Arkansas, Arizona, California, Kansas, Kentucky, Missouri, New Mexico, North Carolina, Oklahoma, and Tennessee. Climate Zone 3 consists of all other states.
5. The overall coefficient of heat transmission (U_o) shall be determined by methods outlined in 10 CFR 460.102 (e) and is expressed in units of Btu / (hr.) (sq. ft.) (F).
6. SHGC requirements apply to windows, skylights and doors $\geq 50\%$ glazed. An area-weighted average of windows, skylights and doors $\geq 50\%$ glazed shall be permitted to satisfy the SHGC requirements.
7. Ducts are not required to be buried within ceiling insulation. If they are, DOE recommends but does not require that the ducts comply with the insulation and leakage requirements of Sections 403.3.3 and 403.3.7 of the 2021 International Energy Conservation Code, as well as the vapor retarder requirements of Section 604.11 of the 2021 International Mechanical Code or Section M1601.4.6 of the 2021 International Residential Code. Burying ducts within ceiling insulation is not an alternative to the requirement that ducts in unconditioned attics have at least R-8 duct insulation.
8. DOE Reserves the right to add additional point package options to Exhibit 2 as revisions to this specification. New options will be published and made available to all program participants if developed.
9. 'Heat Pump' refers to an air-source or ground-source heat pump, including those with electric, gas, or propane backup. The SEER2 and HSPF2 metrics are established by Appendix M1 to the Uniform Test Method for Measuring the Energy Consumption of Central Air Conditioners and Heat Pumps contained in 10 CFR 430 and heat pump manufacturers are required to report performance using these metrics by January 1, 2023.
10. One fixture per home may be excluded from the requirement to install an LED light. As an alternative to installing LED lighting at the manufacturing plant, LED bulbs may be shipped in packaging with the home.
11. For a list of current ENERGY STAR products, visit www.energystar.gov/products.
12. Reduce Thermal Bridging Option 1: Advanced framing
 - a. Minimum stud spacing of 16 in. on center; AND
 - b. All wall corners have at least R-6 insulation; AND
 - c. Double flat header permitted for doors and windows up to 46.5"; triple flat permitted up to 66"; headers on edge insulated, except where other sizes required structurally; AND
 - d. Limit framing to a maximum of one pair of jack studs per window opening to support the header and windowsill, except where additional jack studs are needed for structural support.
13. Window Flashing (for homes with weather resistant barrier installed over sheathing) shall be installed using the following steps (note: equivalent innovative materials may be installed per flashing material manufacturer's instructions):
 - a. Cut an "I" in the weather resistant barrier over the window rough opening; AND
 - b. Install pan flashing in the window rough opening; AND
 - c. Caulk or otherwise seal the top and sides of the window rough opening, but not the bottom; AND
 - d. Install the window over the caulk, then flash the sides and top of the window and finally, fold down the head flap and tape its seams and bottom edge.
14. Window Flashing (for homes using hard siding and no sheathing) shall be installed using the following steps (note: equivalent innovative materials may be installed per flashing material manufacturer's instructions):
 - a. Install pan flashing in the window rough opening over the siding; AND
 - b. Caulk or otherwise seal the top and sides of the window rough opening, but not the bottom; AND
 - c. After the installation of the windows, flash the bottom, the sides, and top of the window; AND
 - d. Use trim to cover the flashing.
15. Flash doors as described above for windows and consistent with door manufacturer's instructions



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16. Step and kickout flashing (for roofs with roof-wall intersections) shall be installed using the following steps (note: equivalent innovative materials may be installed per flashing material manufacturer's instructions):
 - a. Apply roof underlayment over roof deck and up the sidewall over weather resistant barrier; AND
 - b. Install shingle starter strip then kick-out diverter; attach to roof deck but not sidewall; AND
 - c. Place first shingle and next section of sidewall flashing over upper edge of diverter; AND
 - d. Install remaining sidewall flashing, counter flashing, and shingles; AND
 - e. Apply self-adhesive flashing over top edge of the wall flashing, diverter, and weather resistant barrier; AND
 - f. Install the weather resistant barrier, cut house wrap to fit over diverter, and tape top of cut.
17. All the following radon-resistant features must be installed in homes in EPA Radon Zone 1 (except for homes on raised pier foundations):
 - a. Capillary break installed according to Specification 1.2, irrespective of climate zone.
 - b. Exception: In dry climates as defined by 2015 IECC Figure 301.1, a "pipe loop" in a trench of clean aggregate along the entire inside perimeter of the foundation (installed according to ANSI/AARST CCAH 403.1.1) can be used in lieu of a uniform layer of aggregate under the entire slab.
 - c. A 3 or 4 in. diameter gas-tight vertical vent pipe, clearly labeled as a component of a radon reduction system. The vent pipe shall be connected to an open T-fitting in the aggregate layer (or connected to geotextile drainage matting according to the manufacturer's instructions) beneath the polyethylene sheeting, extending up through the conditioned spaces and terminating a minimum of 12 in. above the roof opening. At least 10 ft. of horizontal perforated drain tile is to be attached to the T-fitting beneath the polyethylene sheeting placed over earthen crawlspace and below concrete slabs. Note: suction points are not permitted on sump lids.
 - d. Radon fan (i.e., an active system) OR an electrical receptacle installed in an accessible attic location near the radon vent pipe (i.e., a passive system) to facilitate future fan installation if needed. A space surrounding the radon pipe, having a vertical height of not less than 48 inches and a diameter of not less than 21 inches, shall be provided in the attic area where the radon fan can be installed, if required.
 - e. Homes with no accessible attic location for a fan must utilize another exterior location or a garage that is not below conditioned space per ANSI/AARST CCAH. The branch circuit supply shall be labeled at the electrical panel indicating its intended use.
 - f. Foundation air sealing with polyurethane caulk or the equivalent at all slab openings, penetrations and control or expansion joints.