

SECTION 018113
Innis Road - Lowrise
SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

GENERAL CONDITIONS

- A. The General Conditions, Modifications to General Conditions, Supplementary or Special Conditions and any Instructions to Bidders shall apply to all Divisions of work.
- B. The requirements of State, Local or appropriate codes applicable to the work, whichever is the most stringent is a requirement of all Divisions of work.

WORK OF THIS SECTION

- A. LEED Certification requirements
- B. The intent of this project is to achieve a **Silver- level** LEED certification under the **LEED BD+C Homes and Multifamily Low-rise** rating system.
- C. Contractor shall coordinate work and requirements with Owner Contracted LEED Homes verification team comprising **LEED Provider and Green Rater**. Pertinent to LEED certifications the role of the verification team is to guide the construction team with certification process; review documentation, verify green requirements are met; and to perform third-party testing.

REFERENCES

- A. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
 - 1. ASHRAE 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
 - 2. ASHRAE 62 - Ventilation for Acceptable Indoor Air Quality.
 - 3. ASHRAE 90.1 - Energy Efficient Design of New Buildings except Low-Rise Residential Buildings.
 - 4. ASHRAE 129 - Measuring Air-Change Effectiveness.
- B. ASTM International:
 - 1. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
 - 2. ASTM E903 - Standard Test Method for Solar Absorption, Reflectance, and Transmittance of Materials Using Integrating Spheres.
- C. Bay Area Air Quality Management District: BAAQMD Regulation 8, Rule 51 –
- D. Adhesive and Sealant Products. Carpet and Rug Institute: CRI Green Label Testing Program.
- E. Forest Stewardship Council: FSC Guidelines- Forest Stewardship Council Guidelines.
- F. Green Seal: GS-11 - Product Specific Environmental Requirements.
- G. California Department of Public Health Standard Method V1.1–2010, using CA Section 01350, Appendix B.
- H. Sheet Metal and Air Conditioning Contractors: SMACNA IAQ - IAQ Guidelines for Occupied Buildings under Construction.
- I. South Coast Air Quality Management District: SCAQMD Rule 1168 - Adhesive and Sealant Applications.

- J. U.S. Environmental Protection Agency:
 - 1. EPA 832-R-92-005 - Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
 - 2. EPA Baseline IAQ - Testing for Indoor Air Quality, Baseline IAQ, and Materials Section 01445
 - 3. EPA 402-K-01-002 – A Step-by-Step Guide on how to Build Radon-Resistant Homes
- K. U.S. Green Building Council:
 - 1. LEED Version 4 - Reference Guide for Homes Design & Construction
- L. ENERGY STAR Qualified Homes
 - 1. Energy Star National Rater Design Review Checklist
 - 2. Energy Star National Rater Field Checklist
 - 3. Energy Star National HVAC Design Report
 - 4. Energy Star National HVAC Commissioning Checklist
 - 5. Energy Star Water Management System Builder Checklist

SUBMITTALS

- A. The contractor shall submit the following items directly to the Green Rater.
 - 1. Attendee list of On-site LEED Trades Training meeting moderated by LEED Verification Team (LEED Green Rater and/or Provider-QAD)
 - 2. Energy Star Water Management System Builder Checklist signed and initialed by General Contractor.
- B. Energy Star HVAC System Quality Installation Contractor Checklist signed and initialed by HVAC Contractor credentialed by an EPA-recognized HVAC Quality Installation Training and Oversight Organization (H-QUITO)
 - 1. If tropical wood is used – Provide invoices for FSC certified wood with Chain of Custody Certificate number.
 - 2. Construction Waste Volume or Weight and Diversion Rate (Calculation and Waste Hauling Tickets)
 - 3. Provide documentation of dates and times of preoccupancy flush schedule to Green Rater.
- C. Signed LEED Accountability Form certifying that all products meet or exceed the specified requirements and the requirements of LEED, as noted with "LEED". Submit this information as part of the product submittals.
- D. The contractor shall submit cut-sheets of products intended to comply with Environmentally Preferable Products (EPP). See LEED checklist for list of products intended to meet this requirement. EPP criteria are as follows:
 - 1. Recycled Content Requirement:
 - a. Minimum 25% post-consumer or 50% post-industrial. OR
 - b. The product contains at least 25% reclaimed material, including salvaged, refurbished, or reused materials.
 - c. Bio-based materials. Bio-based products must meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials must be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country.
 - d. Concrete that consists of at least 30% fly ash or slag used as a cement substitute and 50% recycled content or reclaimed aggregate OR 90% recycled content or reclaimed aggregate.
 - 2. Low Emissions Requirement– See specific requirements for Low-VOC paints, Adhesives and Sealants at end of this section.
 - 3. Local Production Requirement – Extracted, manufactured, and fabricated (all processes) within a 100-mile crow-fly distance of site.

QUALITY ASSURANCE

1. Perform work in accordance with the **LEED Version 4 - Reference Guide for Homes Design & Construction** for prerequisites and credits pertinent to this project listed in LEED Checklist included at the end of this section.
- A. Maintain one copy of LEED for Homes Rating System document on site. Download at <https://www.usgbc.org/resources/leed-v4-homes-and-multifamily-midrise-current-version>
 - B. Perform inspections to assure conformance to Energy Star Qualified Homes Checklists throughout construction of the project. A copy of all pertinent Energy Star Inspection Checklists is enclosed at end of this section.
 - C. Monitor closely any requests for substitution for products that are related to LEED prerequisites and credits. Unless reviewed thoroughly substitutions may jeopardize projects' ability to obtain certification.
 - D. Perform storm water management and erosion control Work in accordance with EPA Best Management Practices or local erosion and sedimentation control standards, whichever is more stringent.
 - E. Perform Work to meet or exceed minimum energy efficiency and performance in accordance with Energy Star requirements and local energy code, whichever is more stringent.
 - F. Perform Work without use of CFC based refrigerants in HVAC building systems.
 - G. Perform ventilation Work in accordance with ASHRAE 62.
 - H. Develop and implement construction indoor air quality management plan including the following:
 1. Comply with minimum requirements of SMACNA IAQ.
 2. Protect stored and installed absorptive materials from moisture damage.
 - a. Store materials on elevated platforms under cover, and in dry location.
 - b. When materials are not stored in enclosed location, cover tops and sides of material with secured waterproof sheeting.
 3. Protect HVAC equipment during construction.
 - a. Shut down return side of HVAC system whenever possible during heavy construction or demolition.
 - b. When HVAC system is operated during heavy construction, furnish disposable temporary filters.
 4. Pre-Occupancy Flush: Flush the entire building with fresh air for a total of 48 hours after all construction is complete. Run continuous fans through the duration of the flush. Replace all HVAC filters upon completion.

PART 2 – PRODUCTS

PRODUCT SUBSTITUTION

- A. Monitor closely any requests for substitution for products that are related to LEED prerequisites and credits. Unless reviewed thoroughly substitutions may jeopardize projects' ability to obtain certification.

PART 3 - EXECUTION

LEED PREREQUISITES AND CREDITS (See enclosed LEED Checklist for more information)

INTEGRATIVE PROCESS

A. IP Credit 1.3 (option 3) – Trades Training

1. At the onset of construction organize a LEED trades training moderated by LEED Green Rater and/or Provider-QAD.
2. Following trades to attend - GC Project Manager, GC Site Superintendent, Mechanical-Electrical-Plumbing, Insulation, Framing, Drywall, Air-Infiltration Package.
3. Provide a minimum of 2-week notice to LEED Green Rater prior to training date.

SUSTAINABLE SITES

A. SS Prerequisite 1 - Construction Activity Pollution Prevention

1. Stockpile and protect disturbed topsoil from erosion (for reuse).
2. Control the path and velocity of runoff with silt fencing or comparable measures.
3. Protect on-site storm sewer inlets, streams, and lakes with straw bales, silt fencing, silt sacks, rock filters, or comparable measures.
4. Provide swales to divert surface water from hillsides.
5. Use tiers, erosion blankets, compost blankets, filter socks, berms, or comparable measures to stabilize soils in any area with a slope of 15% (6.6:1) or more that is disturbed during construction.
6. Prevent air pollution from dust and particulate matter.
7. Construction sites larger than 1 acre must conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency Construction General Permit or local equivalent, whichever are more stringent.

B. SS Prerequisite 2 - No Invasive Plants

1. Coordinate with Landscape Contractor to ensure no invasive plant species are introduced into landscape.

C. SS Credit 3 – Non-toxic Pest Control

1. Design a minimum 6-inch inspection space between the surface of the planned landscape grade and non-masonry siding.
2. Seal all external cracks, joints, penetrations, edges, and entry points with appropriate caulking. Install rodent and corrosion-proof screens (e.g., copper or stainless-steel mesh) on all openings greater than 1/4 inch, except where code prohibits their installation (e.g., dryer vents).
3. Design discharge points for rain gutters, air-conditioning condensation lines, steam vent lines, or any other moisture source such that discharge is at least 24 inches from the foundation.
4. Multifamily building projects **must** develop an integrated pest management policy that includes guidance for residents on pesticide use, housekeeping, and prompt reporting of pest problems; incorporate the policy in the Homeowner Education Manual.

WATER EFFICIENCY

A. WE Prerequisite 1 – Water Metering

1. Multifamily: Install a water meter for each building.

B. WE Credit 2 – Indoor Water Use

Provide product data showing flow rates for following fixtures:

1. Average flow rate of lavatory faucets shall be 1.00 gallons per minute or less. Each lavatory faucet or faucet aerator must be WaterSense labeled.
2. Average flow rate of showers shall be 1.50 gallons per minute or less. Each showerhead fixture and fitting must be WaterSense labeled.
3. The water pressure in the house must not exceed 60 pounds per square inch (414 kPa), with no detectable water leaks. (Multifamily and midrise projects are exempt from the water pressure testing criterion).

ENERGY & ATMOSPHERE

A. EA Prerequisite 1– Minimize Energy Performance (Single-Family and Multifamily Low-rise)

1. Meet the requirements of ENERGY STAR for Homes, version 3.
2. Complete the thermal enclosure system rater checklist, the HVAC system quality installation rater and contractor checklists, and the water management system builder checklist. Certified Passive House projects automatically meet the thermal enclosure system rater checklist requirement. Achieve a HERS index rating at or below the HERS index target or meet the requirements of the ENERGY STAR for Homes version 3.
3. At least one of the following appliances must be ENERGY STAR qualified and installed in each dwelling unit: refrigerator; OR dishwasher; OR clothes washer.
4. All duct runs must be fully ducted (i.e., building cavities may not be used as ducts).
5. Minimum envelope leakage –
following areas of building envelope and demising walls shall be sealed, caulked, gasketed, or weather-stripped to minimize envelope leakage:
 - a. Joints around windows and doors.
 - b. Joints between walls and foundation; between conditioned spaces and attics, demising walls, crawl spaces or garage.
 - c. Seal joints between sill plate and drywall.
 - d. Seal joints between top plate and drywall.
 - e. All mechanical, plumbing, and electrical penetrations in exterior and demising walls. Mechanical chase shall be sealed at crawl space ceiling.
 - f. Exterior sheathing and house wrap.
 - g. Minimize entry of air from outdoors, attic, garage, and crawl space into exterior wall and interior wall cavities to ensure passing of air infiltration test.
 - h. Batt insulation shall be stapled to face of stud to ensure full contact of insulation with face of drywall. Cut insulation around all mechanical, plumbing, and electrical work.
6. Thermal Bypass Inspection -
The Green Rater will conduct a visual Thermal Bypass Inspection to inspect proper installation and continuity of thermal insulation and air-tightness of envelope. This inspection must take place after exterior envelope insulation has been installed, but prior to and installation of any drywall. One inspection per floor shall be conducted. If additional inspections are deemed necessary due construction sequencing, Contractor shall notify the Architect and Green Rater immediately. Contractor shall schedule the inspection with no less than a two-week notice to the Green Rater. Contractor shall provide access to each unit and cooperate with conducting of the test. Additional inspections necessary due to incomplete work shall be back-charged to the Contractor. A sample Thermal Bypass Inspection Checklist is enclosed in section 018113.
7. Final Inspections -
Upon substantial completion and prior to occupancy, the Green Rater will conduct a visual Final Inspection to verify green requirements incorporated in the project. The contractor shall notify the Green Rater at least four (4) weeks prior to the anticipated date for such inspection. Contractor shall provide access to each unit and cooperate with conducting of the test. Additional inspections necessary due to incomplete work shall be back-charged to the Contractor.
8. Third-Party Testing -
Third-party Testing is to be scheduled and conducted in conjunction with the final inspection. The contractor shall notify the Green Rater at least four (4) weeks prior to the anticipated date for such inspection. Contractor shall provide access to each unit and cooperate with conducting of the test. The following tests shall be conducted by Green Rater:
 - a. Air Infiltration Test (Blower door Test) – Mandatory – Measures air leakage through unit enclosure such as exterior walls, demising walls, ceilings, chases, etc.

- b. Distribution Loss Test (Duct Blaster Test) – Mandatory – Measures leakage through the mechanical distribution system
- c. Exhaust Test - Measures exhaust rate for bathroom fans and kitchen fans.
- d. Flow Test and Balancing – Measure air flow at each supply register and pressure differential between rooms.

B. EA Prerequisite 2 – Energy Metering

For Multifamily Buildings

- 1. Install an electricity meter or submeter for each residential unit and a gas meter for the entire building, or a gas meter or sub-meter for each unit. Single room–occupancy units, transitional and temporary housing, and designated supportive housing buildings do not need an energy meter in each unit but must have a whole-building energy meter.

C. EA Prerequisite 3 – Education of the Homeowner, Tenant, or Building Manager

- 1. General Contractor to provide to Owner or Owner's Building Management an operations and maintenance manual, binder, or CD that includes all the following items:
 - a. the completed checklist of LEED-related features;
 - b. a copy of each signed accountability form;
 - c. copies of all ENERGY STAR for Home, version 3, checklists;
 - d. product manufacturers' manuals for all installed equipment, fixtures, and appliances;
 - e. general information on efficient use of energy, water, and natural resources;
 - f. operations and maintenance guidance for any installed equipment, including space heating and cooling, mechanical ventilation, humidity control, radon protection, renewable energy, and irrigation, rainwater harvesting, or graywater systems (following 2009 EPA WaterSense Single-Family New Home Specifications, item 5.0, Homeowner Education);
- 2. LEED Green Rater to assist with following items for inclusion in manuals:
 - a. guidance on occupants' activities and choices, including cleaning materials and methods, water-efficient landscaping, integrated pest management, effects of chemical fertilizers and pesticides, irrigation, lighting selection, and appliance selection;
 - b. information on local green power options; and
 - c. information on sharing utility data with USGBC via a USGBC-approved third party.
- 3. General Contractor to conduct a minimum one-hour walkthrough of the home with Owner and/or building manager. The walkthrough must feature the following:
 - a. identification of all installed equipment;
 - b. instruction in how to use and operate the equipment; and
 - c. information on its maintenance.

MATERIALS & RESOURCES

A. MR Prerequisite 1 – Certified Tropical Wood

- 1. All wood in the building must be non-tropical, reused or reclaimed, or certified by the Forest Stewardship Council, or USGBC-approved equivalent.
- 2. If tropical wood is used it must be FSC Certified. Provide vendor's chain-of-custody certificate number must be shown on any invoice that includes FSC-certified products.

B. MR Prerequisite 2 – Durability Management

- 1. Meet the requirements of the ENERGY STAR for Homes, version 3, water management system builder checklist attached at end of this section.
- 2. Install all the applicable indoor moisture control measures:
 - a. Area directly above bathtub, spa, or shower (extending to ceiling), exposed wall or area behind fiberglass enclosure if wallboard is installed - Use non-paper-faced backer board or paper-faced product or coating over wallboard that meets standard ASTM D 3273 standard
 - b. Kitchen, bathroom, laundry room, spa area - Use water-resistant flooring; do not install carpet.

- c. Install water resistant flooring (not carpet) within 3 feet of exterior doors accessible from ground.
- d. Tank water heater in or over living space - Install drain and drain pan, drain pan and automatic water shut-off or flow restrictor, or floor drain with floor sloped to drain.
- e. Clothes washer (or condensing clothes dryer) in or over living space - Install drain and drain pan, drain pan and automatic water shut-off or flow restrictor, floor drain with floor sloped to drain, or braided washer hose.
- f. Conventional clothes dryer - Exhaust directly to outdoors

C. MR Credit 1 – Durability Management Verification

- 1. LEED verification team (Green Rater) to inspect and verify each measure listed in the ENERGY STAR for Homes, version 3, water management system builder checklist.
- 2. Allow Green Rater access to the premise to inspect items in ENERGY STAR for Homes, version 3, water management system builder checklist.

D. MR Credit 2 – Environmentally Preferable Products

- 1. Option 1 - Local Production - Use products that were extracted, processed, and manufactured locally within 100 miles of site and for the following components (at least 50% of the component). Contractor to provide documentation proving compliance with Environmentally Preferable Product requirements for the following products:
 - a. Aggregate for concrete and foundation
- 2. Option 2 – Environmentally Preferable Products –OR Use products that contain at least 25% **postconsumer** or 50% **preconsumer** content. Use synthetic gypsum board products that contain at least 95% recycled content and non-synthetic gypsum board products that contain at least 10% post-consumer recycled content. Contractor to provide documentation proving compliance with Environmentally Preferable Product requirements for the following products:
 - a. Insulation
 - b. Drywall, Interior Finish

E. MR Credit 4 – Material Efficient Framing

- 1. Implement any of the following advanced framing techniques for at least 90% of each component.
 - a. Space floor joists greater than 16 inches o.c. or.
 - b. Space roof rafters greater than 16 inches o.c.

INDOOR ENVIRONMENTAL QUALITY

Multifamily

- 1. Local Exhaust
 - a. Design and install local exhaust systems in all bathrooms (including half-baths) and the kitchen to meet the requirements of ASHRAE Standard 62.2–2010, Sections 5 and 7 or local equivalent, whichever is more stringent. Provide minimum intermittent local exhaust flow rates of 100 cfm or 5ACH in kitchen, and 50 cfm in bathrooms.
 - b. Exhaust air to the outdoors. Do not route exhaust ducts to terminate in attics or interstitial spaces. Just recirculating range hoods or recirculating over-the-range microwaves do not satisfy the kitchen exhaust requirements.
 - c. Use ENERGY STAR–labeled bathroom exhaust fans in all bathrooms.
 - d. For exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (188 liters per second), provide makeup air at a rate approximately equal to the exhaust air rate. Makeup air systems must have a means of closure and be automatically controlled to start and operate simultaneously with the exhaust system.
- 2. Ventilation
 - a. Fresh air ventilation to dwelling units shall comply with ventilation requirements of ASHRAE 62.2–2010.

- b. Do not use systems that rely on transfer air from pressurized hallways or corridors, adjacent dwelling units, attics, etc.
 - c. Project teams using exhaust-only ventilation systems must comply with flow rate required by ASHRAE 62.2–2010. If bathroom exhaust fan is used for exhaust-only fresh-air ventilation, then refer to HVAC drawings for exhaust fan run-time and controls. Coordinate continuous / intermittent fan run-time and controls with HVAC and Electrical contractor. Provide dual-speed bathroom exhaust fan with continuous speed set to 30 cfm in 1-Bedroom units, 45 cfm in 2-Bedroom units, 45 cfm in 3-Bedroom units, or 60 cfm in 4-bedroom units
 - d. Continuous in-unit ventilation fans must be rated for sound at a maximum of 1.0 sone, per ASHRAE 62.2–2010, Section 7.2.1. Remote mounted fans need not meet these sound requirements.
 - e. Locate air inlets that are part of the ventilation design at least 10 feet (3 meters) from known sources of contamination, such as a stack, vent, exhaust hood, or vehicle exhaust. Place the intake such that entering air is not obstructed by snow, plantings, or other material. Forced air inlets must be covered by screens to exclude rodents and insects (mesh not larger than 1/2 inch or 13 millimeters).
3. For all non-unit spaces, meet the minimum requirements of ASHRAE Standard 62.1–2010 or local equivalent, whichever is more stringent, Sections 4–7, Ventilation for Acceptable Indoor Air Quality (with errata). Mechanically ventilated spaces must be designed using the ventilation rate procedure or the applicable local code, whichever is more stringent. Ventilation fans that penetrate rated assemblies may require radiation and fire dampers to meet local building and fire codes.

A. EQ Prerequisite 2 – Combustion Venting

- 1. Do not install any unvented combustion appliances (ovens and ranges excluded).
- 2. Install a carbon monoxide (CO) monitor on each floor, hard-wired with a battery backup. In multifamily buildings, install a CO monitor on each floor of each unit.
- 3. For all fireplaces and woodstoves inside the building, provide doors that close or a solid glass enclosure. Interior fireplaces and woodstoves that are not closed-combustion or power-vented must pass BPI or RESNET combustion safety testing protocols to ensure that depressurization of the combustion appliance zone is less than 5 Pa.
- 4. Space- and water-heating equipment that involves combustion must meet one of the following:
 - a. it must be designed and installed with closed combustion (i.e., sealed supply air and exhaust ducting);
 - b. it must be designed and installed with power-vented exhaust; or
 - c. it must be located in a detached utility building or open-air facility.

B. EQ Prerequisite 3 – Garage Pollutant Protection

- 1. Place all air-handling equipment and ductwork outside the fire-rated envelope of the garage.
- 2. Tightly seal shared surfaces between the garage and conditioned spaces, including all of the following:
 - a. In conditioned spaces above the garage, seal all penetrations and all connecting floor and ceiling joist bays.
 - b. In conditioned spaces next to the garage, weather-strip all doors, install carbon monoxide detectors in rooms that share a door with the garage, seal all penetrations, and seal all cracks at the base of the walls.

C. EQ Prerequisite 4 – Radon-Resistant Construction

New Construction

- 1. Provide a Passive or Active Radon Mitigation System per following requirements:
 - a. Install polyethylene sheeting or extruded polystyrene (XPS) insulation beneath concrete slabs, including basement floors. Ensure sheeting is in direct contact with the concrete

- slab above. Install a capillary break at all crawlspace floors using ≥ 6 mil polyethylene sheeting, lapped 6 to 12 in.
- b. Under the polyethylene sheeting or extruded polystyrene (XPS) insulation installed to meet ENERGY STAR Water Management System Builder Checklist Item 1.3:
 - i. Install a 4 in. layer of 1/2 in. diameter or greater clean aggregate; OR
 - ii. Install a 4 in. uniform layer of sand, overlain with either a layer of geotextile drainage matting throughout or strips of geotextile drainage matting along the perimeter installed according to the manufacturer's instructions.
 - c. A 3 or 4 in. diameter gas-tight vertical vent pipe, clearly labeled to conform with the radon-resistant standard used, e.g., "Radon Reduction System" or "Radon Pipe" or "Radon 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. For crawlspaces, install at least 5 ft. of horizontal perforated drain tile on either side of the T-fitting, attached to the vertical radon vent pipe beneath the sheeting and running parallel to the long dimension of the house.
 - d. Radon fan installed in the attic (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.
2. The requirements for radon protection are automatically satisfied if the building is elevated by at least 2 feet (600 millimeters), with open air space between the building and ground. An enclosed vented crawlspace does not qualify. A garage under a building is an acceptable alternative.
 3. Foundation air sealing with polyurethane caulk or the equivalent at all slab openings, penetrations and control or expansion joints.

D. EQ Prerequisite 5 – Air Filtering

1. Install air filters with a minimum efficiency reporting value (MERV) of 8 or higher on all recirculating space conditioning systems, per ASHRAE 62.2–2010. Design ductwork and specify the central blower to account for the pressure drop across the filter. Air filter housings must be airtight to prevent bypass or leakage.
2. Non-ducted systems are exempt from the minimum MERV 8 requirements but must have an internal air filter in the air-handling unit.
3. Install air filters rated MERV 6 or higher for mechanically supplied outdoor air for systems with 10 feet (3 meters) of ductwork or more, per ASHRAE 62.2–2010, Section 6.7.

E. EQ Prerequisite 6 – Environmental Tobacco Smoke

Multifamily

1. Provide signage to:
 - a. prohibit smoking in common areas,
 - b. prohibit smoking within 25 feet of building entrances.
 - c. or prohibit smoking on the entire property.

F. EQ Prerequisite 7 – Compartmentalization

1. Compartmentalize each residential unit to minimize leakage between units. Minimize uncontrolled pathways for environmental tobacco smoke and other indoor air pollutants between units by sealing penetrations in walls, ceilings, and floors and by sealing vertical chases (including utility chases, garbage chutes, mail drops, and elevator shafts) adjacent to the units.
2. Weather-strip all doors in the residential units leading to common hallways to minimize air leakage into the hallway. Weather-strip all exterior doors and operable windows to minimize leakage from outdoors.
3. Demonstrate acceptable sealing of residential units by a blower door test. Follow the procedure described by RESNET or the ENERGY STAR Multifamily High Rise Program

Testing and Verification Protocols, Version 1.0, with an allowable maximum leakage of 0.30 cfm₅₀ per square foot (0.07 cmm₅₀ per square meter) of enclosure (i.e., all surfaces enclosing the apartment, including exterior and party walls, floors, and ceiling) for new construction buildings.

4. Third-party Testing is to be scheduled and conducted in conjunction with the final inspection. The contractor shall notify the Green Rater at least four (4) weeks prior to the anticipated date for such inspection. Contractor shall provide access to each unit and cooperate with conducting of the test. The following tests shall be conducted by Green Rater:
 - a. Air Infiltration Test (Blower door Test) – Mandatory – Measures air leakage through unit enclosure.

G. EQ Credit 1.1 (option 1) – Enhanced Ventilation - Enhanced Local Exhaust

1. Use one of the following strategies in every bathroom with a shower, bathtub, or spa (i.e., half-baths are exempt) to control the use of the local exhaust fan:
 - a. an occupancy sensor;
 - b. an automatic humidistat controller;
 - c. a continuously operating exhaust fan; or
 - d. a delay timer that operates the fan for at least 20 minutes

H. EQ Credit 1.2 (option 2) – Enhanced Ventilation - Enhanced Whole-House Ventilation

1. Install a balanced whole-house ventilation system (not just exhaust only or supply only) that meets the minimum ventilation requirements of ASHRAE Standard 62.2–2010, Sections 4 and 7, or local equivalent whichever is more stringent. Program the system such that it does not exceed the standard's requirements by more than 10%.

I. EQ Credit 3.1 (option 1) – Balancing of H&C Distribution Systems - Multiple Zones

1. Multifamily buildings whose average unit size is less than 1,200 square feet (110 square meters) automatically meet the requirements of this credit.

J. EQ Credit 3.3 (option 3) – Balancing of H&C Distribution Systems - Pressure Balancing

1. Facilitate for Green Rater or a Third-Party to test each bedroom for pressure difference of more than 3 Pa (0.012-inch w.c.) with respect to the main body of the house when doors are closed, and the air handler is operating on highest speed.

K. EQ Credit 5 – Enhanced Combustion Venting

1. For any wood- or pellet-burning stoves, install equipment that is EPA certified. For wood-burning fireplaces, install equipment that is EPA qualified. Provide power or direct venting.
2. For any natural gas, propane, or alcohol stoves, install equipment listed by an approved safety testing facility. The stove must have a permanently fixed glass front or gasketed door and an electronic pilot. Provide power or direct venting.

L. EQ Credit 7 – Low Emitting Products

1. In the interior of the home, use products that have been tested and found compliant with the California Department of Public Health Standard Method V1.1–2010, using CA Section 01350, Appendix B, New Single-Family Residence Scenario, for emissions testing guidance. At least 90% of a component must meet the requirements to earn credit.
 - a. For site-applied interior paints and coatings, meet the requirements of CA Section 01350.
 - b. For flooring, meet the requirements of CA Section 01350.
 - c. For insulation, meet the requirements of CA Section 01350.

TABLE 1. Acceptable certifications for emissions and content requirements		
CERTIFICATION	TESTING STANDARD REFERENCED IN LEED	APPLICABLE CATEGORIES
SCS Indoor Advantage Gold	CDPH Standard Method v1.1 ANSI/BIFMA M7.1-2011	General Emissions Evaluation (many product categories), Furniture
FloorScore	CDPH Standard Method v1.1	Flooring
Carpet and Rug Institute (CRI) Green Label Plus	CDPH Standard Method v1.1	Carpeting, carpet padding, adhesives
Greenguard Children and Schools	CDPH Standard Method v1.1	General Emissions Evaluation (many product categories including exterior applied products)
Collaborative for High Performance Schools (CHPS)	CDPH Standard Method v1.1	General Emissions Evaluation (many product categories)
CARB ULEF label	N/A	Composite Wood

ENCLOSURES

Low-Rise

Renovation & New Construction

- 1 LEED for Homes Scorecard and Credit Categories
- 2 Energy Star National Rater Design Review Checklist
- 3 Energy Star National Rater Field Checklist
- 4 Energy Star National HVAC Design Report
- 5 Energy Star National HVAC Commissioning Checklist
- 6 Energy Star Water Management System Builder Checklist

END OF SECTION

Innis Road Scorecard (ID:)Project Address **Innis Road**

Note: The information on this tab is READ-ONLY. To edit this information, see the Credit Category tabs.

Total		Certification Level:		Not Certified		Verified	
						0	
	Integrative Process		Preliminary	Y	2 of 2	M	0
	IPc	Integrative Process			2 of 2		0
	Location and Transportation		Preliminary	Y	10 of 15	M	3
	LTp	Floodplain Avoidance			Required		Not Verified
	LTc	LEED for Neighborhood Development			0 of 15		0
	LTc	Site Selection			6 of 8		2
	LTc	Compact Development			2 of 3		1
	LTc	Community Resources			2 of 2		0
	LTc	Access to Transit			0 of 2		0
	Sustainable Sites		Preliminary	Y	1.5 of 7	M	0.5
	SSp	Construction Activity Pollution Prevention			Required		Not Verified
	SSp	No Invasive Plants			Required		Not Verified
	SSc	Heat Island Reduction			0 of 2		0
	SSc	Rainwater Management			0 of 3		0
	SSc	Nontoxic Pest Control			1.5 of 2		0.5
	Water Efficiency		Preliminary	Y	4 of 12	M	3
	WEp	Water Metering			Required		Not Verified
	WEc	Total Water Use			0 of 12		0
	WEc	Indoor Water Use			4 of 6		1
	WEc	Outdoor Water Use			0 of 4		2
	Energy and Atmosphere		Preliminary	Y	15 of 38	M	9
	EAp	Minimum Energy Performance			Required		Not Verified
	EAp	Energy Metering			Required		Not Verified
	EAp	Education of the Homeowner, Tenant or Building Manager			Required		Not Verified
	EAc	Annual Energy Use			15 of 29		5
	EAc	Efficient Hot Water Distribution System			0 of 5		4
	EAc	Advanced Utility Tracking			0 of 2		0
	EAc	Active Solar-Ready Design			0 of 1		0
	EAc	HVAC Start-Up Credentialing			0 of 1		0



Materials and Resources		Preliminary	Y	4.5 of 10	M	2.5	Verified	0
MRp	Certified Tropical Wood	Required						Not Verified
MRp	Durability Management	Required						Not Verified
MRc	Durability Management Verification	1 of 1		0				
MRc	Environmentally Preferable Products	2.5 of 4		0				
MRc	Construction Waste Management	0 of 3		2				
MRc	Material-Efficient Framing	1 of 2		0.5				



Indoor Environmental Quality		Preliminary	Y	12 of 16	M	0.5	Verified	0
EQp	Ventilation	Required						Not Verified
EQp	Combustion Venting	Required						Not Verified
EQp	Garage Pollutant Protection	Required						Not Verified
EQp	Radon-Resistant Construction	Required						Not Verified
EQp	Air Filtering	Required						Not Verified
EQp	Environmental Tobacco Smoke	Required						Not Verified
EQp	Compartmentalization	Required						Not Verified
EQc	Enhanced Ventilation	3 of 3		0				
EQc	Contaminant Control	0 of 2		0.5				
EQc	Balancing of Heating and Cooling Distribution Systems	2 of 3		0				
EQc	Enhanced Compartmentalization	0 of 1		0				
EQc	Enhanced Combustion Venting	2 of 2		0				
EQc	Enhanced Garage Pollutant Protection	2 of 2		0				
EQc	Low-Emitting Products	3 of 3		0				



Innovation		Preliminary	Y	3 of 6	M	0	Verified	0
INp	Preliminary Rating	Required						Not Verified
INc	Innovation	3 of 5		0				
INc	LEED Accredited Professional	0 of 1		0				



Regional Priority		Preliminary	Y	4 of 4	M	0	Verified	0
RPc	Regional Priority	4 of 4		0				

Point Floors

The project earned at least 8 points total in Location and Transportation and Energy and Atmosphere

No

The project earned at least 3 points in Water Efficiency

No

The project earned at least 3 points in Indoor Environmental Quality

No

Total

Preliminary Y 56 of 110 M 18.5 Verified 0

Certification Thresholds Certified: 40-49, Silver: 50-59, Gold: 60-79, Platinum: 80-110

Integrative Process

Preliminary Y 2 Maybe 0 Verified 0

IP Credit Integrative Process

Up to 2 points

Exemplary Performance: Achieve all three options

Preliminary Y 2 M 0 Verified 0

Option 1. Integrative Project Team (1 point)

Y 1 M V

Team members, in addition to the builder and verification team, include capabilities in at least three of the following skill sets: architecture or residential building design; mechanical or energy engineering; building science or performance testing; green building or sustainable design; and civil engineering, landscape architecture, habitat restoration, or land-use planning.

All team members referenced above were involved in at least three of the following phases of the design and construction process: conceptual or schematic design; LEED planning; preliminary design; energy and envelope systems analysis or design; design development; and construction.

Meetings were conducted with the project team at least monthly to review project status, introduce new team members to project goals, discuss problems, formulate solutions, review responsibilities, and identify next steps.

AND/OR

Option 2. Design Charrette (1 point)

Y 1 M V

A full-day workshop (or two half-day workshops) was conducted with the project team, as defined in Option 1, no later than the design development phase.

Date(s)
Duration

AND/OR

Option 3. Trades Training (1 point)

Y 1 M V

At least eight hours of training on the green aspects of the project and how the trades can contribute to achieving each LEED for Homes prerequisite and attempted credit was conducted before construction but after trades have been hired for the project.

Date(s)
Duration
Trainer

Location and Transportation

Preliminary Y 10 Maybe 3 Verified 0

LT Prerequisite Floodplain Avoidance

Required

Select one of the following:

- ☐ True The project is not built on land within a flood hazard area.
- ☐ The project is built on land within a flood hazard area and in accordance with flood provisions.
- ☐ The project is built on land within a flood hazard area and is a previously developed building and hardscape.

Verified

LT Credit LEED for Neighborhood Development

15 points

Preliminary Y M Verified

- Name of LEED for Neighborhood Development project
- LEED ND project ID number
- Rating system and version
- LEED ND certification date

LT Credit Site Selection

Up to 8 points

Exemplary Performance: Earn all 9 points

Preliminary Y 6 M 2 Verified 0

Option 1. Sensitive Land Protection (3-4 points)

Y 4 M 0 V 0

Path 1. Previously Developed (4 points)

Y 4 M V

3.19	Total buildable land area (acre or sq ft)
3.19	Previously developed buildable land area (acre or sq ft)
100.00%	Percentage of lot previously developed (%)

OR

Path 2. Avoidance of Sensitive Land (3 points)

Y M V

All new buildings, hardscapes, roads, or parking areas of the project are located on land that meets the following criteria:

- ☐ Does not consist of prime farmland, unique farmland, or farmland of statewide or local importance.
- ☐ Was not public parkland prior to acquisition.
- ☐ Is not in a flood hazard area shown on a legally adopted flood hazard map or otherwise legally designated by the local jurisdiction or state.
- ☐ Is not on land specifically identified as habitat for species listed in the U.S. Endangered Species Act; the state's endangered species act; NatureServe GH, G1, or G2 lists; or those listed under local equivalent standards (for projects outside the U.S.) that are not covered by NatureServe data.
- ☐ Is not on land within 50 ft (15 m) of wetlands or within the setback distance from wetlands prescribed by local, state or national regulations, whichever is more stringent.
- ☐ Is not on land within 100 ft (30 m) of water bodies, including seas, lakes, rivers, streams and tributaries.

AND/OR

Option 2. Infill Development (2 points)

Y M V

Percent of land within a 1/2 mile (800 meters) from the project boundary that is previously developed

Alternatively, for projects within city limits of towns with populations less than 20,000

Percent of land adjacent to the project boundary that is previously developed

AND/OR

Option 3. Open Space (1 point)

Y M V

Select one of the following:

Built within 1/2 mile (800 meters) of open space that is at least 3/4 acres (0.3 hectares)

Create publicly available open space on the project site

AND/OR

Option 4. Street Network (1 point)

Y M V

Qualifying intersection density (intersections per square mile)

AND/OR

Option 5. Bicycle Network and Storage (1 point)

Y M V

Bicycle Network

Select one of the following. The project has a functional entry and/or bicycle storage within 200 yd (180 m) of a bicycle network that connects to:

At least 10 uses

A school or employment center

A bus rapid transit stops, rail stations, and/or ferry terminals

Bicycle Storage for Multifamily Buildings

Number of building occupants

Number of residential units

Number of short-term spaces provided

Number of short-term spaces required

Number of long-term spaces provided

Number of long-term spaces required

Bicycle Storage for Single Family Homes

The project is a single family home with garage.

LT Credit Compact Development

Up to 3 points

Exemplary Performance for Single and Multifamily Lowrise Only: 35 DU/acre (86.5 DU/hectare)

Preliminary Y M Verified

Total project boundary area (acre)

Buildable land area (acre)

Number of dwelling units

DU/acre of buildable land

LT Credit Community Resources

Up to 2 points

Exemplary Performance: 16 uses for 1/2 point, 20 uses for 1 point.

Preliminary Y M Verified

Number of community resources within a 1/2 mile (800 meters) walking distance

LT Credit Access to Transit

Up to 2 points

Exemplary Performance: For multiple transit types, 720 weekday trips and 432 weekend trips; For commuter rail or ferry, 120 weekday trips.

For projects with multiple transit types

Number of weekday trips

Number weekend day trips

For projects with commuter rail or ferry service only

--

Number of weekday trips

Preliminary Y

--

M

--

Verified

--

Sustainable Sites

Preliminary Y 1.5 Maybe 0.5 Verified 0

SS Prerequisite Construction Activity Pollution Prevention

Required

Confirm all of the following measures were implemented on the project, as applicable:

Verified

- True Stockpiled and protected disturbed topsoil from erosion.
- True Controlled the path and velocity of runoff with silt fencing or comparable measures.
- True Protected on-site storm sewer inlets, streams, and lakes with straw bales, silt fencing, silt sacks, rock filters, or comparable measures.
- True Provided swales to divert surface water from hillsides.
- True Used tiers, erosion blankets, compost blankets, filter socks, berms, or comparable measures to stabilize soils in any area with a slope of 15% (6.6:1) or more that was disturbed during construction.
- True Prevented air pollution from dust and particulate matter.

For construction sites larger than 1 acre

Select one of the following:

- True The project team created an implemented an Erosion and Sedimentation Control (ESC) plan that conforms to the requirements of the 2012 U.S. Environmental Protection Agency Construction General Permit (CGP).
- The project team created an implemented an Erosion and Sedimentation Control (ESC) plan that conforms to local standards and codes, which are as or more stringent than the 2012 EPA Construction General Permit (CGP).

SS Prerequisite No Invasive Plants

Required

Verified

- True No invasive plant species have been introduced into the landscape.

SS Credit Heat Island Reduction

Up to 2 points

Option 1. Shading and Option 2. Nonabsorptive Materials (1-2 points)

Preliminary Y M Verified

Hardscapes

- Area of shaded hardscapes (sq ft)
- Area of unshaded paving materials with an initial SR value of at least 0.33 (sq ft)
- Area of unshaded vegetation in open pavers (sq ft)
- Remaining hardscape area (not earning credit) (sq ft)
- 0 Total hardscape area (driveways, walkways, patios, etc.) (sq ft)

Roof

- Area of ENERGY STAR qualified roof (sq ft)
- The ENERGY STAR roofing program had a sunset date effective June 1, 2022. Single family projects can use the LEED v4.1 Single Family pathway for 'High-Reflectance Roof. Use roofing materials that have an aged SRI equal to or greater than the values in Table 1. See the rating system for Table 1.' LEED v4 Multifamily projects can pursue the LEED v4.1 Multifamily credit substitution approach as outlined in the LEED v4.1 Guide.
- Area of vegetated roof (sq ft)
- Remaining roof area (not earning credit) (sq ft)
- 0 Total roof area (sq ft)
- 0% Percentage of area with shading or nonabsorptive material (%)

SS Credit Rainwater Management

Up to 3 points

Preliminary Y 0 M 0 Verified 0

Exemplary Performance: For Case 1, manage 100% of all stormwater on-site.

Case 1. Low Impact Development (1-3 points)Y M V *Site Characteristics* 0 Total lot area (sq ft)*Roof* Vegetated roof area (sq ft)
 Roof area directed to a qualifying infiltration feature (sq ft)
 Remaining roof area (not earning credit) (sq ft)
 0 Total roof area (sq ft)*Non-roof Site Area**Softscape* Total landscape softscape area (sq ft)*Hardscape* Permeable paving (sq ft)
 Qualifying open pavers (sq ft)
 Hardscapes directed to qualifying infiltration features (sq ft)
 Remaining hardscape area (not earning credit) (sq ft)
 0 Total hardscape area (driveways, walkways, patios, etc.) (sq ft)*Qualifying area, as a percentage of total lot area* 0.0% Qualifying area, as percentage of total lot area (%)*Reduction of total impermeable area* 0 Total impermeable area of the project (sq ft)
 Reference home size (sq ft)
 0.0% Impermeable area as a percentage of reference home size

OR

Case 2. NPDES Projects (2-3 points)Y M V Percentile rainfall event

SS Credit Nontoxic Pest Control

Up to 2 points

Exemplary Performance: Projects that achieve 2 points can earn another ½ point for each additional strategy, up to a total of 1 point.

	Preliminary	Y	1.5	M	0.5	Verified	
Select all of the following that have been included in the project.							
☐							Install a steel mesh barrier termite control system. (1 point)
☐							Install a physical termite barrier system (e.g., basaltic rock) approved by code. (1 point)
☐							For below-grade walls, use solid concrete foundation walls, masonry walls with a course of solid block bond beam, or concrete-filled block. (0.5 point)
☐							Install post-tension slabs. (0.5 point)
☐							Treat all cellulosic structural material (e.g., wood framing) with a registered pesticide containing borates, following the manufacturer's directions for preconstruction treatment. (0.5 point)
☐							Use noncellulosic material for all structural elements. (0.5 point)
☐							Install ports or openings for all plumbing elements that penetrate the slab, to allow access for inspection and treatment of pest infestations. (0.5 point)
☐							Install a registered termite bait system and provide for ongoing maintenance as required by the manufacturer. (0.5 point)
☐ Yes							Design a minimum 6-inch (150 millimeters) inspection space between the surface of the planned landscape grade and nonmasonry siding. (0.5 point)
☐ Yes							Seal all external cracks, joints, penetrations, edges, and entry points with appropriate caulking. Install rodent- and corrosion-proof screens (e.g., copper or stainless steel mesh) on all openings greater than ¼ inch (6 millimeters), except where code prohibits their installation. (0.5 point)
☐ Yes							Design discharge points for rain gutters, air-conditioning condensation lines, steam vent lines, or any other moisture source such that discharge is at least 24 inches (600 millimeters) from the foundation. (0.5 point)
☐ maybe							Design landscape features to provide a minimum 18-inch (450 millimeters) space between the exterior wall and any plantings. (0.5 point)
<i>For multifamily projects</i>							
☐ Yes							Develop an integrated pest management policy. The policy must include guidance for residents on pesticide use, housekeeping, and prompt reporting of pest problems. The policy must be incorporated in the Homeowner Education Manual. (Required)

Water Efficiency

Preliminary Y 4 Maybe 3 Verified 0

WE Prerequisite Water Metering

Required

Verified

OR

Case 2. Multifamily

V

True

A water meter or submeter is installed for each unit.

A water meter or submeter is installed for the whole building.

WE Credit Total Water Use

Up to 12 points

Exemplary Performance: 70% reduction of indoor and outdoor water consumption

Preliminary Y M Verified

0.00%

Total reduction of indoor and outdoor water consumption as calculated in the [Water Reduction Calculator](#) (%)

For single family projects

The water pressure does not exceed 60 psi (415 kPa). There are no detectable water leaks. Any installed water softeners are demand initiated.

For multifamily projects

There are no detectable water leaks. Any installed water softeners are demand initiated.

WE Credit Indoor Water Use

Up to 6 points

Preliminary Y 4 M 1 Verified 0

OR

Case 2. Multifamily and Midrise

Y

4

M

1

V

True

There are no detectable water leaks.

Note: No additional credit is awarded if the fixtures and fittings in non-unit spaces are more efficient than those of in-unit spaces.

Meet any of the following for in-unit spaces and non-unit spaces:

Lavatory Faucet (1-2 points)

True

All installed lavatory faucets and/or faucet aerators are WaterSense labeled.

1.00

Average rated flow volume across all lavatory faucets (gpm)

Showerheads (1-2 points)

True

All installed showerhead fixtures and fittings are WaterSense labeled.

1.50

Average rated flow volume per shower compartment (gpm)

Toilets (1 point)

True

All installed toilet fixtures and fittings are WaterSense labeled.

maybe - 1.1

Average rated flush volume across all toilets (gpf)

Clothes Washers (1 point)

True

All clothes washers are ENERGY STAR qualified or performance equivalent

WE Credit Outdoor Water Use

Up to 4 points

Preliminary Y M 2 Verified

Turf grass area as a percentage of total landscape softscape area (%)

Native or adapted plant area as a percentage of total landscape softscape area (%)

Energy and Atmosphere

Preliminary Y 15

Maybe 9

Verified 0

EA Prerequisite Minimum Energy Performance

Required

Verified

ENERGY STAR

True

ENERGY STAR version 3 checklists are complete

HERS index rating

ENERGY STAR HERS index target

OR

ENERGY STAR Builder Option Package has been followed and all requirements met.

Is the project pursuing LI 10492, 10491, or 10486?

If pursuing ENERGY STAR MFNC, which version did the project earn?

If pursuing ENERGY STAR SNFH, which version did the project earn?

ENERGY STAR Qualified Appliances

Select at least one of the following:

True

ENERGY STAR refrigerator is installed.

ENERGY STAR dishwasher is installed.

ENERGY STAR clothes washer is installed.

Duct Runs

True

All duct runs are fully ducted.

EA Prerequisite Energy Metering

Required

Verified

Case 1. Single Family

V

A whole-house electric meter is installed.

A whole-house gas meter is installed.

OR

Case 2. Multifamily

V

Electric submeters are installed in each residential unit.

A whole-building gas meter or submeter for each residential unit is installed.

EA Prerequisite Education of Homeowner, Tenant, or Building Manager

Required

Verified

An operations and maintenance manual, binder, or CD has been/will be provided to all individuals or organizations responsible for the maintenance of the home.

A minimum one-hour walkthrough of the home with the occupants has been conducted.

EA Credit Annual Energy Use

Up to 29 points

Preliminary

Y

15

M

5

Verified

0

Exemplary Performance: For Option 1, 100% reduction; For Option 2, -10 HERS index rating.

Projects may choose to pursue either Option 1 or Option 2 based on the option that produces the most points.

Y

15

M

5

V

Option 1. LEED Energy Budget (1-29 points)

	LEED Energy Budget (MMBtu/year)
	Annual energy consumption (MMBtu/year)
	Percent reduction below LEED Energy Budget (%)
	Total Points

Other major energy users not included in the energy rating (if any):

	Heated driveway		Spa
	Private pool		Heated garage

	Other (describe in detail)
--	----------------------------

OR

Option 2. HERS Index with Home Size Adjuster (0.5-29 points)

Y

15

M

5

V

	HERS index rating
	Number of bedrooms
	Conditioned floor area of the house (sq ft)
	ENERGY STAR for Homes, version 3, reference home floor area (sq ft)
7	HSA points
	Points for achieving HERS index rating
	Total (HSA points + Points for achieving HERS index rating)

EA Credit Efficient Hot Water Distribution System

Up to 5 points

Preliminary

Y

0

M

4

Verified

0

Option 1. Efficient Hot Water Distribution (2 points)

Y

0

M

2

V

0

Note: Projects using heat traces that serve a single unit or house are awarded only half credit.

For projects using circulating systems (required for both Path 1 AND Path 2 below)

	Circulating pump does not operate continuously, is not on a timer, or is not on a water temperature sensor.
	Circulating pump is demand activated by a momentary contact switch, motion sensor, flow switch, door switch or voice command.
	After the pump starts, the controls allow the pump to operate until the water temperature in the return pipe rises not more than 10°F (6 °C) above the initial temperature of the water in the pipe. Controls limit the water temperature to a maximum of 105°F (40 °C). Controls limit pump operation to not more than 5 minutes per activation in the event that both means of shutting off the pump have failed.
	Circulating hot water systems have with an automatic or readily accessible manual switch to turn off the hot water circulating pump when not in use.

For projects using heat-traced piping systems

	Piping is insulated.
--	----------------------

Path 1. Maximum Allowable Pipe Length (2 points)

Y

M

2

V

	Pipe or tube length installed (ft)
	Nominal pipe size (in)
	Maximum pipe or tube length allowed for water heaters, boilers with no circulation loop or heat traced pipe or in multifamily buildings a central circulation loop or heat traced pipe (ft)
	Maximum pipe or tube length allowed for circulation loop or heat traced pipe serving a single unit or house (ft)

OR

Path 2. Maximum Allowable Pipe Volume (2 points)

Y

M

V

	Volume of hot or tempered water from source to termination (oz)
--	---

OR

Option 2. Performance Test (3 points)

Y M V

Note: Projects using heat traces that serve a single unit or house are awarded only half credit.

For projects using circulating systems (required for both Case 1 AND Case 2 below)

Circulating pump does not operate continuously, is on a timer, or is on a water temperature sensor.

Circulating pump is demand activated by a momentary contact switch, motion sensor, flow switch, door switch or voice command.

After the pump starts, the controls allow the pump to operate until the water temperature in the return pipe rises not more than 10°F (6 °C) above the initial temperature of the water in the pipe. Controls limit the water temperature to a maximum of 105°F (40 °C). Controls limit pump operation to not more than 5 minutes per activation in the event that both means of shutting off the pump have failed.

Circulating hot water systems have with an automatic or readily accessible manual switch to turn off the hot water circulating pump when not in use.

For projects using heat-traced piping systems

Piping is insulated.

Case 1. Hot water source is a water heater or boiler with no circulation loop or heat traced pipe; or in multifamily buildings a central circulation loop or heat traced pipe.

Y M V

Meets WaterSense Labeled New Homes requirements

OR

Tested volume of water stored in piping (gal)

OR

Case 2. Hot water source is a circulation loop or heat traced pipe serving a single unit or house

Y M V

Tested volume of water stored in piping (gal)

AND/OR

Y M V

Option 3. Pipe Insulation (2 points)

Insulation R-value

EA Credit Advanced Utility Tracking

Up to 2 points

Preliminary Y M **Verified**

Exemplary Performance: Meter separate energy usage information for at least four end uses.

Case 1. Single Family

Y M V

Option 1. Electric and Water (1 point)

Select one of the following:

Y M V

A permanent energy-monitoring system that records at intervals of one hour or less has been installed.

The house has an automatic in-ground irrigation system and landscaped irrigated area larger than 1,000 sq ft (93 sq m) and has installed a submeter to monitor all irrigation system components.

AND/OR

Option 2. Third-Party Utility Reporting (1 point)

Y M V

The homeowner has shared all applicable utility data with USGBC via a USGBC-approved third-party.

Case 2. Multifamily

Y M V

Option 1. Electric and Water (1 point)

Select one of the following:

Y M V

A permanent energy-monitoring system that records at intervals of one hour or less has been installed in each unit.

The project has an automatic in-ground irrigation system and landscaped irrigated area larger than 1,000 sq ft (93 sq m) and has installed a submeter to monitor all irrigation system components.

AND/OR

Option 2. Third-Party Utility Reporting (1 point)

Y M V

Path 1. Whole-Building Master Meter

Y M V

The building owner has shared all applicable utility data with USGBC via a USGBC-approved third-party.

OR

Path 2. Individual Unit Meters

Y M V

At least 50% of unit owners or occupants have shared all applicable utility data with USGBC via a USGBC-approved third-party.

EA Credit Active Solar-Ready Design

1 point

Preliminary Y M **Verified**

Exemplary Performance: Achieve Option 1 and Option 2.

Option 1. Photovoltaic-Ready Design (1 point)

Y M V

Note: Projects that install a photovoltaic (PV) system that meets the requirements of EA Credit Renewable Energy are not eligible for this credit.

The house meets EPA's solar photovoltaic specifications for a renewable energy-ready home.

AND/OR

Option 2. Solar Direct Hot Water-Ready Design (1 point)

Y M V

Note: Projects that install a solar direct hot water (DHW) system that meets the requirements of EA Credit Efficient Domestic Hot Water Equipment are not eligible for this credit.

Meets EPA's solar water heating specifications for a renewable energy-ready home.

EA Credit HVAC Start-Up Credentialing

1 point

Preliminary Y M **Verified**

Name of technician

Company of technician

Technician commissioning all heating, cooling, and ventilation systems has the following credential

Materials and Resources

Preliminary Y 4.5 Maybe 2.5 Verified 0

MR Prerequisite Certified Tropical Wood

Required

Verified

True

All wood in the building is nontropical, reused or reclaimed, or certified by the Forest Stewardship Council, or USGBC-approved equivalent.

MR Prerequisite Durability Management

Required

Verified

True

ENERGY STAR for Homes, version 3, water management system checklist is collected from builder.

Confirm all of the following have been implemented on the project:

True

Nonpaper-faced backer board, or a product or coating over wallboard that meets standard ASTM D 3273 standard, was installed on the area above bathtub, spa or shower, and in areas behind fiberglass enclosures where wallboard is installed.

True

Water-resistant flooring was installed in the kitchen, bathroom(s), laundry room, spa area(s). No carpet was installed in these areas.

True

Water-resistant flooring was installed in entryways within 3 feet of exterior door(s).

True

A drain and drain pan, drain pan and automatic water shut-off or flow restrictors, or floor drain with floor sloped to drain was installed for all tank water heaters in or over living space.

True

A braided washer hose, drain and drain pan, drain pan and automatic water shut-off or flow restrictors, or floor drain with floor sloped to drain was installed for clothes washer in or over living space.

True

Conventional clothes dryers exhaust directly to outdoors.

MR Credit Durability Management Verification

1 point

Preliminary Y 1 M Verified

True

Each measure in the ENERGY STAR for Homes, version 3, water management system builder checklist was verified by the verification team.

MR Credit Environmentally Preferable Products

Up to 4 points

Preliminary Y 2.5 M 0 Verified 0

Exemplary Performance: For Option 2, achieve a minimum of 4 points to earn another 2 points for purchasing products that meet the requirements.

Option 1. Local Production

Preliminary Y 0.5 M Verified

Select which the following were extracted, processed, and manufactured within 100 miles (160 km) of the project site:

100.00

Percentage of locally produced framing (%) (0.5 point)

Percentage of locally produced aggregate for concrete and foundation (%) (0.5 point)

Percentage of locally produced drywall and interior sheathing (%) (0.5 point)

AND/OR

Option 2. Environmentally Preferable Products

Preliminary Y

2

M

Verified

Select the criteria met by at least 90% of the component:

No Floor Covering (2 points)	
Floor Covering (1 point)	
Insulation (1 point)	At least 25% postconsumer or 50% preconsumer recycled content
Sheathing (1 point)	
Framing (1 point)	
Drywall (1 point)	For synthetic, 95% recycled content (pre-, post-, or combination)
Concrete (1 point)	
Roofing (1 point)	
Siding (1 point)	

Select criteria met for at least 3 of the following additional components by at least 90% of the component (1 point):

Doors	
Cabinets	
Counters	
Interior Trim	
Decking/Patio	
Windows	

MR Credit Construction Waste Management

Up to 3 points

Exemplary Performance: For renovation projects, track and divert at least 50% of demolition waste.

Preliminary Y

M

2

Verified

	LEED Reference Home Baseline Waste (lbs)
	Total Construction Waste (including recycled waste) (lbs)
	Recycled Waste (lbs)
0.00	Project Construction Waste (lbs)
	Percent reduction below baseline (%)

MR Credit Material-Efficient Framing

Up to 2 points

Exemplary Performance: Achieve a minimum of 2 points to earn up to 1/2 point for each additional requirement met.

Preliminary Y

1

M

0.5

Verified

Select one of the following for at least 90% of each component: (1 point)

	No more than one horizontal 2x top plate on walls by aligning studs with joists and roof rafters was installed.
	Window and door headers were placed in the rim joist.
	Raised (directly beneath the top plate), single-ply headers not more than 2 inches nominal thickness in a 2x4 wall or 4 inches nominal thickness in a 2x6 wall, were installed.
	Structural insulated panels (SIPs) were installed for walls.

Select at least 2 of the following for at least 90% of each component: (0.5 point)

True	Headers were sized for actual loads.
maybe	Ladder blocking or drywall clips were used.
	Two-stud corners or California corners were used.

Select all that apply for at least 90% of each component: (0.5 point each)

	Interior wall studs were spaced greater than 16 inches (400 mm) o.c.
True	Floor joists were spaced greater than 16 inches (400 mm) o.c. or SIPs.
True	Roof rafters were spaced greater than 16 inches (400 mm) o.c. or SIPs.

Indoor Environmental Quality

Preliminary Y 12 Maybe 0.5 Verified 0

EQ Prerequisite Ventilation

Required

Verified

OR

Case 2. Multifamily

V

Local Exhaust

Confirm all of the following have been implemented on the project:

True

Local exhaust systems meeting the requirements of ASHRAE Standard 62.2-2010, Sections 5 and 7 or local equivalent, whichever is more stringent, were installed in all bathrooms (including half-baths) and the kitchen.

True

Local exhaust systems exhaust air directly to the outdoors.

True

All bathroom exhaust fans are ENERGY STAR-labeled or an HRV or ERV is used.

True

For exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (188 liters per second), makeup air is provided at a rate approximately equal to the exhaust air rate. Makeup air systems have a means of closure and can be automatically controlled to start and operate simultaneously with the exhaust system.

Whole Unit Mechanical Ventilation

True

The project meets ASHRAE Standard 62.2-2010 Sections 4 and 7 or local equivalent, whichever is more stringent.

Non-Unit Spaces

True

The project meets the minimum requirements of ASHRAE Standard 62.1-2010 Sections 4 -7 or local equivalent, whichever is more stringent.

The project is located in a nonattainment area for PM2.5. The project has installed MERV 11 or higher filters.

The project is located in a nonattainment area for ozone.

EQ Prerequisite Combustion Venting

Required

Verified

The project has earned the EPA Indoor airPLUS label

OR

True

No unvented combustion appliances were installed (ovens and ranges excluded).

True

A carbon monoxide (CO) monitor is installed on each floor, hard-wired with a battery backup.

For projects with fireplaces or woodstoves installed

N/A

Provide doors that close or a solid glass enclosure.

N/A

Closed-combustion, power-vented or passes BPI or RESNET combustion safety protocols

For projects where space and water heating equipment involving combustion are installed

Select one of the following:

N/A

Equipment is installed with closed combustion (i.e. sealed supply air and exhaust ducting)

Equipment is installed with power-vented exhaust

Equipment is located in a detached utility building or open-air facility

EQ Prerequisite Garage Pollutant Protection

Required

Verified

- The project has earned the EPA Indoor airPLUS label
- OR
- True All air-handling equipment and ductwork is placed outside the fire-rated envelope of the garage.
- True Shared surfaces between the garage and conditioned spaces are tightly sealed.

Conditioned Spaces Above Garage

- All penetrations and all connecting floor and ceiling joist bays are sealed.

Conditioned Spaces Next to Garage

- N/A All doors are weather-stripped.
- N/A Carbon monoxide detectors are installed in rooms that share a door with the garage.
- N/A All penetrations and all cracks at the base of the walls are sealed.

EQ Prerequisite Radon-Resistant Construction

Required

Verified

Exemplary Performance: For projects in radon zones 2 and 3, install a qualifying passive radon ventilation system.

EPA Indoor airPLUS label

V

- The project has earned the EPA Indoor airPLUS label

OR

Case 1. New Construction

V

- 1 EPA radon zone

For projects in EPA radon zone 1

- True There is a capillary break per the Indoor airPLUS specifications.
- True An electrical outlet has been provided near vent piping in the attic to facilitate future fan installation.
- True A gas-tight vertical vent pipe extending up through the conditioned spaces and terminating above the roof opening has been installed.

OR

- The house is elevated by at least 2 feet (600 millimeters) with open air space between building and ground or there is a garage under the building.

OR

Case 2. Renovation of Existing Building

V

- EPA radon zone

For renovation projects in EPA radon zone 1 with no slab work being performed

- Radon test results (pCi/L)
- If results are greater than 4 pCi/L, an active ventilation system has been installed.

EQ Prerequisite Air Filtering

Required

Verified

- The project has earned the EPA Indoor airPLUS label
- OR
- 8 MERV rating of filters on recirculating space conditioning systems
- 6 MERV rating of filters on mechanically supplied outdoor air systems with 10 ft (3 m) or more of ductwork

EQ Prerequisite Environmental Tobacco Smoke

Required

Verified

For multifamily projects

☐ True Smoking is prohibited in all common areas of the building.

☐ True Smoking is prohibited outside the project building(s) except in designated smoking areas located at least 25 ft (7.5 m) from all entries, outdoor air intakes, and operable windows.

☐ True Signage communicating the smoking policy has been installed.

EQ Prerequisite Compartmentalization

Required

For multifamily and attached single-family projects

☐ True Each residential unit has sealed penetrations through walls, ceilings, and floors and vertical chases adjacent to units.

☐ True All doors in the residential units leading to common hallways have weather-stripping.

☐ True All exterior doors and operable windows have weather-stripping.

Blower door test results (cfm50)

Envelope enclosure area (sq ft)

0.00 Leakage per area of enclosure (cfm50/sq ft)

Verified

EQ Credit Enhanced Ventilation

Up to 3 points

Preliminary Y 3 M 0 Verified 0

Option 1. Enhanced Local Exhaust (1 point)

Y 1 M V

automatic humidistat controller

Bathroom exhaust fan control type in every bathroom with a shower, bathtub, or spa

AND/OR

Option 2. Enhanced Whole-House Ventilation (2 points)

Y 2 M V

☐ True A balanced whole-house ventilation system was designed and installed that meets ASHRAE 62.2-2010 sections 4 and 7 in each home or unit.

☐ True The system does not exceed ASHRAE 62.2-2010 requirements by more than 10%.

EQ Credit Contaminant Control

Up to 2 points

Preliminary Y 0 M 0.5 Verified 0

Exemplary Performance: Achieve a minimum of 2 1/2 points to earn another 1/2 point.

Option 1. Walk-off Mats (0.5 point)

Y M V

☐ For all primary entryways, a permanent walk-off mat that is at least 4 feet (1.2 meters) long and allows access for cleaning has been installed.

For multifamily projects

☐ For exterior entryways in common areas, permanent systems that are at least 10 feet (3 meters) long have been installed.

AND/OR

Option 2. Shoe Removal and Storage (0.5 point)

Y M V

☐ A shoe removal and storage space is near the primary entryway.

☐ No conventional carpet is installed in shoe removal and storage area.

AND/OR

Option 3. Preoccupancy Flush (0.5 point)

Y M V

The project has earned the EPA Indoor airPLUS label
OR

At installation, all permanent ducts and vents were sealed to minimize contamination from construction.

After construction ends and before occupancy

Any dust and debris was removed from ducts.

The home was flushed out for 48 hours, with all windows open, a fan run continuously or all HVAC fans and exhaust fans.

AND/OR

Option 4. Air Testing (1 point)

Y M V

The building was tested for indoor air contaminants and maximum concentrations were not exceeded.

EQ Credit Balancing of Heating and Cooling Distribution Systems

Up to 3 points

Preliminary Y M **Verified**

Case 1. Forced-Air Systems

Y M V

Option 1. Multiple Zones (1 point)

Y M V

A system with at least two space-conditioning zones with independent thermostatic controls has been installed.
OR

The project is a single family home less than 800 sq ft (74 sq m) or a multifamily building whose average unit size is less than 1,200 sq ft (110 sq m).

AND/OR

Option 2. Supply Air-Flow Testing (1 point)

Y M V

The supply air-flow rates are within +/- 20% (or +/- 25 cfm or 11 lps) of calculated values from ACCA Manual J.

AND/OR

Option 3. Pressure Balancing (1 point)

Y M V

The pressure differential between bedroom and rest of the house is less than 3 Pa.

OR

Case 2. Radiative Systems

Y M V

Option 1. Multiple Zones (1 point)

Y M V

A system with at least two zones with independent thermostatic controls has been installed
Each zone has a separate loop and pump controlled automatically by a thermostat control.
OR

The project is a single family home less than 800 sq ft (74 sq m) or a multifamily building whose average unit size is less than 1,200 sq ft (110 sq m).

AND/OR

Option 2. Room-by-Room Controls (2 points)

Y M V

Room-by-room thermostatic controls are installed.

EQ Credit Enhanced Compartmentalization

1 point

Preliminary Y M Verified

0.00 Leakage per area of enclosure (cfm50/sq ft)

EQ Credit Enhanced Combustion Venting

Up to 2 points

Preliminary Y 2 M 0 Verified 0

Option 1. No Fireplace or Woodstove (2 points)

Y 2 M V

True No fireplaces or woodstoves have been installed.

OR

Option 2. Enhanced Combustion Venting Measures (1 point)

Y M V

The project has earned the EPA Indoor airPLUS label

OR

EPA qualified wood- or pellet-burning fireplaces with either power or direct venting have been installed.
 A natural gas, propane, or alcohol stove approved by a safety testing facility and has power or direct venting has been installed.
 A natural gas, propane, or alcohol stove has a permanently fixed glass front or gasketed door and an electronic pilot.

EQ Credit Enhanced Garage Pollutant Protection

Up to 2 points

Preliminary Y 2 M 0 Verified 0

OR

Case 2. Multifamily

Y 2 M 0 V 0

Option 1. Exhaust Fan in Multicar Garage (1 point)

Y M V

Meet all of the following:

All of the requirements in ASHRAE 62.1-2010 for garage ventilation have been met.
 The garage has sufficient exhaust to create negative pressure with respect to adjacent spaces with the doors to the garage closed.
 Self-closing doors have been installed. Deck-to-deck partitions or a hard lid ceiling have been installed.
 The exhaust fan either runs continuously or is on a carbon monoxide sensor that turns on the fan when ambient CO levels reach 35 ppm.

OR

Option 2. Exhaust Fan in Small Garage (1 point)

Y M V

Meet all of the following:

An exhaust fan that meets ENERGY STAR minimum efficacy levels (cfm/W) has been installed.
 Installed direct-exhaust fans are 100 cfm (47 lps) or greater.
 Installed ducted exhaust fans are 130 cfm (61 lps) or greater.
 The exhaust fan either runs continuously or has an automatic timer control linked to an occupant sensor, a light switch, a garage door opening-closing mechanism, or a carbon monoxide sensor that turns on the fan when ambient CO levels reach 35 ppm, or equivalent.
 The exhaust fan has an automatic timer set to provide at least three air changes each time the fan is turned on.

OR

Option 3. No Garage, or Detached Garage (2 points)

Y 2 M V

True No garage has been constructed.

A detached garage has been constructed.

EQ Credit Low-Emitting Products

Up to 3 points

Select all that apply. At least 90% of a component must meet the requirement:

- ☐ True Site-applied interior paints and coatings have been tested and meet the requirements of CA Section 01350. (0.5 point)
- ☐ True Flooring has been tested and meets the requirements of CA Section 01350. (0.5 point)
- ☐ True Insulation has been tested and meets the requirements of CA Section 01350. (0.5 point)
- ☐ Site-applied adhesives and sealants have been tested and meet the requirements of CA Section 01350. (0.5 point)
- ☐ Composite wood products have been tested and meet the California Air Resources Board requirements for ultra-low-emitting formaldehyde (ULEF) resins or no-added formaldehyde based resins. (1 point)

Innovation

Preliminary Y 3

Maybe 0

Verified 0

IN Prerequisite Preliminary Rating

Required

Verified

☐ True

Preliminary rating and meeting are complete.

IN Credit Innovation

To achieve all five innovation points, a project team must achieve at least one pilot credit, at least one innovation credit and no more than two exemplary performance
Up to 5 points

Preliminary Y

M

Verified

Option 1. Innovation (1 point)

Describe the intent of the proposed innovation credit.

Y

M

V

affordable housing

AND/OR

Option 2. Pilot (1 point)

Y

M

V

design for accessibility

Pilot credit name

AND/OR

Option 3. Additional Strategies (0.5-3 points)

Y

M

V

Exemplary Performance: 1-2 points

Strategy Innovation

Credit name IP

Strategy

Credit name

Strategy

Credit name

Strategy

Credit name

Strategy

Credit name

Strategy

Credit name

IN Credit LEED Accredited Professional

1 point

Preliminary Y

M

Verified

Name of credential holder

Regional Priority

Preliminary Y 4 Maybe 0 Verified 0

RP Credit Regional Priority

Up to 4 points

Preliminary Y 4 M Verified

Regional priority credits may be found on www.usgbc.org/rpc.

Regional Priority Credit Name	Required Threshold
HVAC start up credentialing	1
Annual Energy Use (yes)	13
Durability Management Verification (yes)	1
Rainwater management	2
Total Water Use	5
Indoor Water Use (yes)	3
Site Selection (yes)	4
Heat Island Reduction	2
Building Orientation for passive solar	1



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If pursuing Track A - HVAC Grading, complete this page. ¹

Home Address: _____ City: _____ State: _____ Permit Date: _____

1. Partnership Status

**Must
Correct** **Rater ²
Verified**

1.1 Rater has verified and documented that builder has an ENERGY STAR partnership agreement using energystar.gov/partnerlocator. ³

☐

☐

2. High-Performance Fenestration

2.1 Specified fenestration meets or exceeds 2009 IECC requirements. ⁴

☐

☐

3. High-Performance Insulation

3.1 Specified ceiling, wall, floor, and slab insulation levels comply with one of the following options:

3.1.1 Meets or exceeds 2009 IECC levels ^{5, 6, 7} **OR**;

☐

☐

3.1.2 Achieves $\leq 133\%$ of the total UA resulting from the U-factors in 2009 IECC Table 402.1.3, per guidance in Footnote 5d, AND specified home infiltration does not exceed the following: ^{6, 7}

☐

☐

3 ACH50 in CZs 1, 2 2.5 ACH50 in CZs 3, 4 2 ACH50 in CZs 5, 6, 7 1.5 ACH50 in CZ 8

4a. Review of ANSI / RESNET / ACCA Std. 310 HVAC Design Report with ENERGY STAR Supplement

4a.1 HVAC design report compliant with ANSI / RESNET / ACCA Std. 310, with the ENERGY STAR supplement, collected for records, with no items left blank.

☐

☐

4a.2 ANSI / RESNET / ACCA Std. 310 Rater Design Review Checklist completed for applicable housing type, with all items marked, "Rater Verified".

☐

☐

4a.3 Cooling sizing % is within the cooling sizing limit selected by the HVAC designer.

☐

☐

Rater Name: _____ Date of Review: _____

Rater Signature: _____ Rater Company Name: _____



ENERGY STAR Single-Family New Homes National Rater Design Review Checklist, Version 3 / 3.1 (Rev. 11)

If pursuing Track B - HVAC Credential, complete this page.		
Home Address: _____ City: _____ State: _____ Permit Date: _____		
1. Partnership Status	Must Correct	Rater ² Verified
1.1 Rater has verified and documented that builder has an ENERGY STAR partnership agreement using energystar.gov/partnerlocator . ³	☐	☐
1.2 Rater has verified and documented ⁸ that HVAC contractor holds credential required to complete National HVAC Commissioning Checklist, unless all equipment to be installed in home to be certified is an exempted type, in which case check "N/A". ⁹ ☐ N/A HVAC Contractor Company Name: _____	☐	☐
2. High-Performance Fenestration		
2.1 Specified fenestration meets or exceeds 2009 IECC requirements. ⁴	☐	☐
3. High-Performance Insulation		
3.1 Specified ceiling, wall, floor, and slab insulation levels comply with one of the following options:		
3.1.1 Meets or exceeds 2009 IECC levels ^{5,6,7} OR ;	☐	☐
3.1.2 Achieves $\leq 133\%$ of the total UA resulting from the U-factors in 2009 IECC Table 402.1.3, per guidance in Footnote 5d, AND specified home infiltration does not exceed the following: ^{6,7} 3 ACH50 in CZs 1, 2 2.5 ACH50 in CZs 3, 4 2 ACH50 in CZs 5, 6, 7 1.5 ACH50 in CZ 8	☐	☐
4b. Review of ENERGY STAR National HVAC Design Report ¹⁰		
4b.1 National HVAC Design Report collected for records, with no items left blank.	☐	☐
4b.2 National HVAC Design Report reviewed by Rater for the following parameters (National HVAC Design Report Item # in parenthesis):		
4b.2.1 Cooling season and heating season outdoor design temperatures used in loads (3.3) are within the limits defined for the State and County, or US Territory, where the home will be built, or the designer has provided an allowance from EPA to use alternative values. All limits are published at energystar.gov/hvacdesigntemps . Note that revised (i.e., 2019 Edition) limits are required to be used for all HVAC Design Reports generated after 10/01/2020. ¹¹	☐	☐
4b.2.2 Number of occupants used in loads (3.4) is within ± 2 of the home to be certified. ¹²	☐	☐
4b.2.3 Conditioned floor area used in loads (3.5) is between 100 sq. ft. smaller and 300 sq. ft. larger than the home to be certified. ¹³	☐	☐
4b.2.4 Window area used in loads (3.6) is between 15 sq. ft. smaller and 60 sq. ft. larger than the home to be certified, or, for homes to be certified with > 500 sq. ft. of window area, between 3% smaller and 12% larger. ¹⁴	☐	☐
4b.2.5 Predominant window SHGC used in loads (3.7) is within 0.1 of predominant value in the home to be certified. ¹⁵	☐	☐
4b.2.6 Sensible, latent, & total heat gain are documented (3.10 - 3.12) for the orientation of the home to be certified. ¹⁶	☐	☐
4b.2.7 The variation in total heat gain across orientations (3.13) is ≤ 6 kBtu/h. ¹⁶	☐	☐
4b.2.8 Cooling sizing % (4.13) is within the cooling sizing limit (4.15) selected by the HVAC designer.	☐	☐
Rater Name: _____ Date of Review: _____		
Rater Signature: _____ Rater Company Name: _____		



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National Rater Design Review Checklist, Version 3 / 3.1 (Rev. 11)

Footnotes

1. Track A – HVAC Grading shall not be used until an implementation schedule has been defined for ANSI / RESNET / ACCA Std. 310 by the Home Certification Organization (HCO) that the home is being certified under. Track A – HVAC Grading shall then use ANSI / RESNET / ACCA Std. 310 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO that the home is being certified under.
2. The term 'Rater' refers to the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater or Approved Inspector, as defined by ANSI / RESNET / ICC Standard 301, or an equivalent designation as determined by an HCO; and, b) have attended and successfully completed an EPA-recognized training class. See www.energystar.gov/newhomestraining.
3. Raters are only required to document the partnership status of a builder once, for the first home that the Rater certifies for them.
4. All windows, doors and skylights shall meet or exceed the component U-factor and SHGC requirements specified in 2009 IECC Table 402.1.1. If no NFRC rating is noted on the window or in product literature (e.g., for site-built fenestration), select the U-factor and SHGC value from Tables 4 and 10, respectively, in 2013 ASHRAE Fundamentals, Chapter 15. Select the highest U-factor and SHGC value among the values listed for the known window characteristics (e.g., frame type, number of panes, glass color, and presence of low-e coating). Note that the U-factor requirement applies to all fenestration while the SHGC only applies to the glazed portion. The following exceptions apply:
 - a. An area-weighted average of fenestration products shall be permitted to satisfy the U-factor requirements;
 - b. An area-weighted average of fenestration products $\geq 50\%$ glazed shall be permitted to satisfy the SHGC requirements;
 - c. 15 square feet of glazed fenestration per dwelling unit shall be exempt from the U-factor and SHGC requirements, and shall be excluded from area-weighted averages calculated using a) and b), above;
 - d. One side-hinged opaque door assembly up to 24 square feet in area shall be exempt from the U-factor requirements and shall be excluded from area-weighted averages calculated using a) and b), above;
 - e. Fenestration utilized as part of a passive solar design shall be exempt from the U-factor and SHGC requirements, and shall be excluded from area-weighted averages calculated using a) and b), above. Exempt windows shall be facing within 45 degrees of true South and directly coupled to thermal storage mass that has a heat capacity $> 20 \text{ btu} / \text{ft}^3 \times ^\circ\text{F}$ and provided in a ratio of at least 3 sq. ft. per sq. ft. of South facing fenestration. Generally, thermal mass materials will be at least 2 in. thick.

In PHIUS+ or PHI certified homes, where triple-glazed window assemblies with thermal breaks / spacers between the panes are used, such windows meet the intent of Item 2.1 and shall be excluded when assessing compliance of a) through e), above.

5. Specified levels shall meet or exceed the component insulation levels in 2009 IECC Table 402.1.1. The following exceptions apply:
 - a. Steel-frame ceilings, walls, and floors shall meet the insulation levels of 2009 IECC Table 402.2.5. In CZ 1 and 2, the continuous insulation requirements in this table shall be permitted to be reduced to R-3 for steel-frame wall assemblies with studs spaced at 24 in. on center. This exception shall not apply if the alternative calculations in d) are used;
 - b. For ceilings with attic spaces, R-30 shall satisfy the requirement for R-38 and R-38 shall satisfy the requirement for R-49 wherever the full height of uncompressed insulation at the lower R-value extends over the wall top plate at the eaves. This exemption shall not apply if the alternative calculations in d) are used;
 - c. For ceilings without attic spaces, R-30 shall satisfy the requirement for any required value above R-30 if the design of the roof / ceiling assembly does not provide sufficient space for the required insulation value. This exemption shall be limited to 500 sq. ft. or 20% of the total insulated ceiling area, whichever is less. This exemption shall not apply if the alternative calculations in d) are used;
 - d. An alternative equivalent U-factor or total UA calculation may also be used to demonstrate compliance, as follows:

An assembly with a U-factor equal or less than specified in 2009 IECC Table 402.1.3 complies.

A total building thermal envelope UA that is less than or equal to the total UA resulting from the U-factors in Table 402.1.3 also complies. The performance of all components (i.e., ceilings, walls, floors, slabs, and fenestration) can be traded off using the UA approach. Note that Items 3.1 through 3.3 of the National Rater Field Checklist shall be met regardless of the UA tradeoffs calculated. The UA calculation shall be done using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The calculation for a steel-frame envelope assembly shall use the ASHRAE zone method or a method providing equivalent results, and not a series-parallel path calculation method.
6. Consistent with the 2009 IECC, slab edge insulation is only required for slab-on-grade floors with a floor surface less than 12 inches below grade. Slab insulation shall extend to the top of the slab to provide a complete thermal break. If the top edge of the insulation is installed between the exterior wall and the edge of the interior slab, it shall be permitted to be cut at a 45-degree angle away from the exterior wall. Alternatively, the thermal break is permitted to be created using $\geq R-3$ rigid insulation on top of an existing slab (e.g., in a home undergoing a gut rehabilitation). In such cases, up to 10% of the slab surface is permitted to not be insulated (e.g., for sleepers, for sill plates). Insulation installed on top of slab shall be covered by a durable floor surface (e.g., hardwood, tile, carpet).
7. Where an insulated wall separates a garage, patio, porch, or other unconditioned space from the conditioned space of the house, slab insulation shall also be installed at this interface to provide a thermal break between the conditioned and unconditioned slab. Where specific details cannot meet this requirement, partners shall provide the detail to EPA to request an exemption prior to the home's certification. EPA will compile exempted details and work with industry to develop feasible details for use in future revisions to the program. A list of currently exempted details is available at: energystar.gov/slabeledge.
8. Raters' documentation of the HVAC contractor credential must be updated at least once every 12 months.
9. HVAC contractors must be credentialed by an EPA-recognized HVAC Quality Installation Training and Oversight Organization (H-QUITO) if a split air conditioner, unitary air conditioner, air-source heat pump, or water-source (i.e., geothermal) heat pump up to 65 kBtu/h with a forced-air distribution system (i.e., ducts) or a furnace up to 225 kBtu/h with a forced-air distribution system (i.e., ducts) will be installed in the home to be certified. For all other permutations of equipment (e.g., boilers, mini-split / multi-split systems) and distribution systems, a credential is not required. An explanation of this credentialing process and links to H-QUITOs, which maintain lists of credentialed contractors, can be found at energystar.gov/newhomeshvac.



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10. The Rater shall collect one National HVAC Design Report per system design per plan. Regardless of whether the “site-specific design” or “group design” box has been checked in Item 1.6 of the National HVAC Design Report, the system design as documented on the National HVAC Design Report must fall within the tolerances in Item 4b.2 for the home to be certified. The report is only required to be collected once per system design, even if multiple homes are built using this design (e.g., in a production environment where the same plan is built multiple times, only one report is required as long as no aspect of the system design changes between homes). The Rater is only responsible for verifying that the designer has not left any items blank on the National HVAC Design Report and for verifying the discrete objective parameters in Item 4b.2 of this Checklist, not for verifying the accuracy of every input on the National HVAC Design Report.
11. Visit energystar.gov/hvacdesigntemps for the maximum cooling season design temperature and minimum heating season design temperature permitted for ENERGY STAR Single-Family New Homes and the process for a designer to obtain an allowance from EPA. The same design report is permitted to be used in other counties, as long as the design temperature limits in those other counties meet or exceed the cooling and heating season temperature limits for the county selected. For example, if Frederick County, VA, is used for the load calculations, with a 1% cooling temperature limit of 93 °F, then the same report could be used in Fairfax County (which has a higher limit of 94 °F) but not in Albemarle County (which has a lower limit of 92 °F).
12. To determine the number of occupants among all HVAC systems in the home, calculate the number of bedrooms, as defined below, and add one. The number of occupants used in loads must be within ± 2 of the home to be certified, unless Item 1.5 of the National HVAC Design Report indicates that the system is a cooling system for temporary occupant loads.

A bedroom is defined by ANSI / RESNET / ICC Standard 301-2014 as a room or space 70 sq. ft. or greater size, with egress window and closet, used or intended to be used for sleeping. A “den”, “library”, or “home office” with a closet, egress window, and 70 sq. ft. or greater size or other similar rooms shall count as a bedroom, but living rooms and foyers shall not.

An egress window, as defined in 2009 IRC section R310, shall refer to any operable window that provides for a means of escape and access for rescue in the event of an emergency. The egress window definition has been summarized for convenience. The egress window shall:

 - have a sill height of not more than 44 inches above the floor; AND
 - have a minimum net clear opening of 5.7 sq. ft.; AND
 - have a minimum net clear opening height of 24 in.; AND
 - have a minimum net clear opening width of 20 in.; AND
 - be operational from the inside of the room without the use of keys, tools or special knowledge.
13. Conditioned Floor Area for the home to be certified shall be calculated in accordance with the definition in ANSI / RESNET / ICC Standard 301-2019.
14. Window area for the home to be certified shall be calculated in accordance with the on-site inspection protocol provided in Normative Appendix B of ANSI / RESNET / ICC Standard 301-2019.
15. “Predominant” is defined as the SHGC value used in the greatest amount of window area in the home.
16. Orientation represents the direction that the front door of the house is facing. The designer is only required to document the loads for the orientation(s) that the house might be built in. For example, if a house plan will only be built one time in a specific orientation (e.g., a site-specific design), then the designer only needs to document the loads for this one orientation.



ENERGY STAR Single-Family New Homes

National Rater Field Checklist, Version 3 / 3.1 (Rev. 11)

Home Address: _____		City: _____		State: _____		Permit Date: _____			
Thermal Enclosure System						Must Correct	Builder Verified ¹	Rater Verified ²	N/A ³
1. High-Performance Fenestration & Insulation									
1.1 Fenestration meets or exceeds specification in Item 2.1 of the National Rater Design Review Checklist.						☐	☐	☐	-
1.2 Insulation meets or exceeds specification in Item 3.1 of the National Rater Design Review Checklist. ⁴						☐	☐	☐	-
1.3 All insulation achieves Grade I install. per ANSI / RESNET / ICC Std. 301. Alternatives in Footnote 5. ^{5,6}						☐	☐	☐	-
2. Fully-Aligned Air Barriers ⁷ - At each insulated location below, a complete air barrier is provided that is fully aligned as follows:									
Ceilings: At interior or exterior horizontal surface of ceiling insulation in Climate Zones 1-3; at interior horizontal surface of ceiling insulation in Climate Zones 4-8. Also, at exterior vertical surface of ceiling insulation in all climate zones (e.g., using a wind baffle that extends to the full height of the insulation in every bay or a tabbed baffle in each bay with a soffit vent that prevents wind washing in adjacent bays). ⁸									
2.1 Dropped ceilings / soffits below unconditioned attics, and all other ceilings.						☐	☐	☐	☐
Walls: At exterior vertical surface of wall insulation in all climate zones; also at interior vertical surface of wall insulation in Climate Zones 4-8. ⁹									
2.2 Walls behind showers, tubs, staircases, and fireplaces.						☐	☐	☐	☐
2.3 Attic knee walls and skylight shaft walls. ¹⁰						☐	☐	☐	☐
2.4 Walls adjoining porch roofs or garages.						☐	☐	☐	☐
2.5 Double-walls and all other exterior walls.						☐	☐	☐	-
Floors: At exterior vertical surface of floor insulation in all climate zones and, if over unconditioned space, also at interior horizontal surface including supports to ensure alignment. Alternatives in Footnotes 12 & 13. ^{11, 12, 13}									
2.6 Floors above garages, floors above unconditioned basements or crawlspaces, and cantilevered floors.						☐	☐	☐	☐
2.7 All other floors adjoining unconditioned space (e.g., rim / band joists at exterior wall or at porch roof).						☐	☐	☐	☐
3. Reduced Thermal Bridging									
3.1 For insulated ceilings with attic space above (i.e., non-cathedralized), Grade I insulation extends to the inside face of the exterior wall below and is $\geq$ R-21 in CZ 1-5; $\geq$ R-30 in CZ 6-8. ¹⁴						☐	☐	☐	☐
3.2 For slabs on grade in CZ 4-8, 100% of slab edge insulated to $\geq$ R-5 at the depth specified by the 2009 IECC and aligned with the thermal boundary of the walls. ^{15, 16}						☐	☐	☐	☐
3.3 Insulation beneath attic platforms (e.g., HVAC platforms, walkways) $\geq$ R-21 in CZ 1-5; $\geq$ R-30 in CZ 6-8.						☐	☐	☐	☐
3.4 At above-grade walls separating conditioned from unconditioned space, one of the following options used (rim / band joists exempted): ¹⁷									
3.4.1 Continuous rigid insulation, insulated siding, or combination of the two is: $\geq$ R-3 in CZ 1-4; $\geq$ R-5 in CZ 5-8 ^{18, 19, 20} , OR ;						☐	☐	☐	☐
3.4.2 Structural Insulated Panels OR ; Insulated Concrete Forms OR ; Double-wall framing OR ; ^{18, 21}						☐	☐	☐	☐
3.4.3 Advanced framing, including all of the Items below: ²²									
3.4.3a Corners insulated $\geq$ R-6 to edge ²³ , AND ;						☐	☐	☐	☐
3.4.3b Headers above windows & doors insulated $\geq$ R-3 for 2x4 framing or equivalent cavity width, and $\geq$ R-5 for all other assemblies (e.g., with 2x6 framing) ²⁴ , AND ;						☐	☐	☐	☐
3.4.3c Framing limited at all windows & doors to one pair of king studs, plus one pair of jack studs per window opening to support the header and sill, AND ;						☐	☐	☐	☐
3.4.3d Interior / exterior wall intersections insulated to same R-value as rest of exterior wall, ²⁵ AND ;						☐	☐	☐	☐
3.4.3e Minimum stud spacing of 16 in. o.c. for 2x4 framing in all Climate Zones and, in CZ 6-8, 24 in. o.c. for 2x6 framing. ²⁶						☐	☐	☐	☐
4. Air Sealing (Unless otherwise noted below, "sealed" indicates the use of caulk, foam, or equivalent material)									
4.1 Ducts, flues, shafts, plumbing, piping, wiring, exhaust fans, & other penetrations to unconditioned space sealed, with blocking / flashing as needed.						☐	☐	☐	-
4.2 Recessed lighting fixtures adjacent to unconditioned space ICAT labeled and gasketed. Also, if in insulated ceiling without attic above, exterior surface of fixture insulated to $\geq$ R-10 in CZ 4-8.						☐	☐	☐	☐
4.3 Above-grade sill plates adjacent to conditioned space sealed to foundation or sub-floor. Gasket also placed beneath above-grade sill plate if resting atop concrete / masonry & adjacent to cond. space. ^{27,28}						☐	☐	☐	☐
4.4 Continuous top plate or blocking is at top of walls adjoining unconditioned space, and sealed.						☐	☐	☐	☐
4.5 Drywall sealed to top plate at all unconditioned attic / wall interfaces using caulk, foam, drywall adhesive (but not other construction adhesives), or equivalent material. Either apply sealant directly between drywall and top plate or to the seam between the two from the attic above.						☐	☐	☐	☐
4.6 Rough opening around windows & exterior doors sealed. ²⁹						☐	☐	☐	-
4.7 Walls that separate attached garages from occupiable space sealed and, also, an air barrier installed and sealed at floor cavities aligned with these walls.						☐	☐	☐	☐
4.8 In multifamily buildings, the gap between the common wall (e.g., the drywall shaft wall) and the structural framing between units sealed at all exterior boundaries.						☐	☐	☐	☐
4.9 Doors adjacent to unconditioned space (e.g., attics, garages, basements) or ambient conditions made substantially air-tight with weatherstripping or equivalent gasket.						☐	☐	☐	☐
4.10 Attic access panels, drop-down stairs, & whole-house fans equipped with durable $\geq$ R-10 cover that is gasketed (i.e., not caulked). Fan covers either installed on house side or mechanically operated. ³⁰						☐	☐	☐	☐



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HVAC System ³¹				Must Correct	Rater Verified ²	N/A ³
5. Heating & Cooling Equipment - Complete Track A - HVAC Grading ³² or Track B - HVAC Credential						
Track A	5a.1 Blower fan volumetric airflow is Grade I or II per ANSI / RESNET / ACCA Std. 310.					
	5a.2 Blower fan watt draw is Grade I or II per ANSI / RESNET / ACCA Std. 310.					
	5a.3 Refrigerant charge is Grade I per ANSI / RESNET / ACCA Std. 310. See Footnote 33 for exemptions. ³³					
Track B	5b.1 HVAC manufacturer & model number on installed equipment matches either of the following (check box): ³⁴ ☐ National HVAC Design Report ☐ Written approval received from designer					-
	5b.2 External static pressure measured by Rater at contractor-provided test locations and documented below: ³⁵ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure: _____ IWC					
	5b.3 Permitted, but not required: National HVAC Commissioning Checklist collected, with no items left blank.					
6. Duct Quality Installation (Applies to Heating, Cooling, Ventilation, Exhaust, & Pressure Balancing Ducts, Unless Noted in Footnote)						
6.1 Ductwork installed without kinks, sharp bends, compressions, or excessive coiled flexible ductwork. ³⁶						
6.2 Bedrooms pressure-balanced (e.g., using transfer grilles, jump ducts, dedicated return ducts, undercut doors) to achieve a Rater-measured pressure differential ≥ -3 Pa and $\leq +3$ Pa with respect to the main body of the house when all air handlers are operating. Test configuration and an alternative compliance option in Footnote 37. ³⁷						-
6.3 All supply and return ducts in unconditioned space, including connections to trunk ducts, are insulated to $\geq R-6$ ³⁸						
6.4 Rater-measured total duct leakage meets one of the following two options. Alternative in Footnote 40: ^{39, 40, 41}						
6.4.1 <u>Rough-in</u> : The greater of ≤ 4 CFM25 per 100 sq. ft. of CFA or ≤ 40 CFM25, with air handler & all ducts, building cavities used as ducts, & duct boots installed. All duct boots sealed to finished surface, Rater-verified at final. ⁴²						
6.4.2 <u>Final</u> : The greater of ≤ 8 CFM25 per 100 sq. ft. of CFA or ≤ 80 CFM25, with the air handler & all ducts, building cavities used as ducts, duct boots, & register grilles atop the finished surface (e.g., drywall, floor) installed. ⁴³						
6.5 Rater-measured duct leakage to outdoors the greater of ≤ 4 CFM25 per 100 sq. ft. of CFA or ≤ 40 CFM25. ^{39, 44}						
7. Dwelling Unit Mechanical Ventilation Systems ("Vent System") ⁴⁵ & Inlets In Return Duct ⁴⁶						
7.1 Rater-measured ventilation rate is within either ± 15 CFM or $\pm 15\%$ of design report value. ⁴⁷						-
7.2 A readily-accessible ventilation override control installed and also labeled if its function is not obvious (e.g., a label is required for a toggle wall switch, but not for a switch that's on the ventilation equipment). ⁴⁸						-
7.3 For any outdoor air inlet connected to a ducted return of the HVAC system (Complete if present; otherwise check "N/A"): ⁴⁶						
7.3.1 Controls automatically restrict airflow using a motorized damper during vent. off-cycle and occupant override. ⁴⁹						
7.3.2 Rater-measured vent. rate is ≤ 15 CFM or 15% above design value at highest HVAC fan speed. Alt. in Fn. 50. ⁵⁰						
7.4 System fan rated ≤ 3 sones if intermittent and ≤ 1 sone if continuous, or exempted. ⁵¹						-
7.5 If Vent System controller operates the HVAC fan, then HVAC fan operation is intermittent and either the fan type is ECM / ICM or the controls will reduce the run-time by accounting for HVAC system heating or cooling hours. ⁵²						
7.6 Bathroom fans are ENERGY STAR certified if used as part of the Vent System. ⁵³						
7.7 Air inlet location (Complete if ventilation air inlet location was specified on design report; otherwise check "N/A"): ^{54, 55}						
7.7.1 Inlet pulls ventilation air directly from outdoors and not from attic, crawlspace, garage, or adjacent dwelling unit.						-
7.7.2 Inlet is ≥ 2 ft. above grade or roof deck; ≥ 10 ft. of stretched-string distance from known contamination sources not exiting the roof, and ≥ 3 ft. distance from dryer exhausts and sources exiting the roof. ⁵⁶						-
7.7.3 Inlet is provided with rodent / insect screen with ≤ 0.5 inch mesh.						-
8. Local Mechanical Exhaust - In each kitchen and bathroom, a system is installed that exhausts directly to the outdoors and meets one of the following Rater-measured airflow and manufacturer-rated sound level standards: ^{47, 57}						
Location		Continuous Rate	Intermittent Rate ⁵⁸			
8.1 Kitchen	Airflow	≥ 5 ACH, based on kitchen volume ^{59, 60}	≥ 100 CFM and, if not integrated with range, also ≥ 5 ACH based on kitchen volume ^{59, 60, 61}			-
	Sound	Recommended: ≤ 1 sone	Recommended: ≤ 3 sones			
8.2 Bathroom	Airflow	≥ 20 CFM	≥ 50 CFM			-
	Sound	Required: ≤ 1 sone	Recommended: ≤ 3 sones			
9. Filtration						
9.1 MERV 6+ filter(s) installed in each ducted mech. system, located to facilitate occupant access & regular service. ⁶²						
9.2 Filter access panel includes gasket and fits snugly against exposed edge of filter when closed to prevent bypass. ⁶³						
9.3 All return air and mechanically supplied outdoor air passes through filter prior to conditioning.						
10. Combustion Appliances						
10.1 Furnaces, boilers, & water heaters are mechanically drafted or direct-vented. Alternatives in Footnote 66. ^{64, 65, 66}						
10.2 Fireplaces are mechanically drafted or direct-vented. Alternatives in Footnote 67. ^{64, 65, 67}						
10.3 If unvented combustion appliances other than cooking ranges or ovens are located inside the home's pressure boundary, the Rater has followed ANSI/ACCA 12 QH-2014, Section 3.2.2, Appendix A Sections A2.2.6, A3, and A4, and verified the equipment meets the limits defined within. ^{64, 68}						
Rater Name: _____		Rater Pre-Drywall Inspection Date: _____		Rater Initials: _____		
Rater Name: _____		Rater Final Inspection Date: _____		Rater Initials: _____		
Builder Employee: _____		Builder Inspection Date: _____		Builder Initials: _____		



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Footnotes

1. At the discretion of the Rater, the builder may verify up to eight items in Sections 1-4 of this Checklist. When exercised, the builder's responsibility will be formally acknowledged by the builder signing off on the checklist for the item(s) that they verified. However, if a quality assurance review indicates that Items have not been successfully completed, the Rater will be responsible for facilitating corrective action.
2. The term 'Rater' refers to the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater or Approved Inspector, as defined by ANSI / RESNET / ICC Standard 301, or an equivalent designation as determined by a Home Certification Organization (HCO); and, b) have attended and successfully completed an EPA-recognized training class. See www.energystar.gov/newhomestraining.
3. The column titled "N/A," which denotes items that are "not applicable," should be used when the checklist Item is not present in the home or conflicts with local requirements.
4. In addition, the infiltration shall not exceed the limits specified in Item 3.1.2 of the National Rater Design Review Checklist, if this option has been used to comply with Item 3.1.
5. Two alternatives are provided: a) Grade II cavity insulation is permitted to be used for assemblies that contain a layer of continuous, air impermeable insulation $\geq R-3$ in Climate Zones 1 to 4, $\geq R-5$ in Climate Zones 5 to 8; b) Grade II batts are permitted to be used in floors if they fill the full width and depth of the floor cavity, even when compression occurs due to excess insulation, as long as the R-value of the batts has been appropriately assessed based on manufacturer guidance and the only defect preventing the insulation from achieving Grade I is the compression caused by the excess insulation.
6. Ensure compliance with this requirement using ANSI / RESNET / ICC Std. 301 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO that the home is being certified under, with approved exceptions listed at www.energystar.gov/ERIEExceptions.
7. For purposes of this Checklist, an air barrier is defined as any durable solid material that blocks air flow between conditioned space and unconditioned space, including necessary sealing to block excessive air flow at edges and seams and adequate support to resist positive and negative pressures without displacement or damage. EPA recommends, but does not require, rigid air barriers.

Open-cell or closed-cell foam shall have a finished thickness ≥ 5.5 in. or 1.5 in., respectively, to qualify as an air barrier unless the manufacturer indicates otherwise.

If flexible air barriers such as house wrap are used, they shall be fully sealed at all seams and edges and supported using fasteners with caps or heads ≥ 1 in. diameter unless otherwise indicated by the manufacturer. Flexible air barriers shall not be made of kraft paper, paper-based products, or other materials that are easily torn. If polyethylene is used, its thickness shall be ≥ 6 mil.
8. All insulated ceiling surfaces, regardless of slope (e.g., cathedral ceilings, tray ceilings, conditioned attic roof decks, flat ceilings, sloped ceilings), must meet the requirements for ceilings.
9. All insulated vertical surfaces are considered walls (e.g., above and below grade exterior walls, knee walls) and must meet the air barrier requirements for walls. The following exceptions apply: air barriers recommended, but not required, in adiabatic walls in multifamily dwellings; and, in Climate Zones 4 through 8, an air barrier at the interior vertical surface of insulation is recommended but not required in basement walls or crawlspace walls. For the purpose of these exceptions, a basement or crawlspace is a space for which $\geq 40\%$ of the total gross wall area is below-grade.
10. Exterior air barriers are not required for attic knee walls that are ≤ 24 in. in height if an interior air barrier is provided and insulation extends in all directions from the top of this interior air barrier into unconditioned space at the following levels: CZ 1-5: $\geq R-21$; CZ 6-8: $\geq R-30$.
11. EPA highly recommends, but does not require, an air barrier at the interior vertical surface of floor insulation in Climate Zones 4-8.
12. Examples of supports necessary for permanent contact include staves for batt insulation or netting for blown-in insulation. Alternatively, supports are not required if batts fill the full depth of the floor cavity, even when compression occurs due to excess insulation, as long as the R-value of the batts has been appropriately assessed based on manufacturer guidance and the only defect preventing the insulation from achieving the required installation grade is the compression caused by the excess insulation.
13. Alternatively, an air barrier is permitted to be installed at the exterior horizontal surface of the floor insulation if the insulation is installed in contact with this air barrier, the exterior vertical surfaces of the floor cavity are also insulated, and air barriers are included at the exterior vertical surfaces of this insulation.
14. The minimum designated R-values must be achieved regardless of the trade-offs determined using an equivalent U-factor or UA alternative calculation. Note that if the minimum designated values are used, then higher insulation values may be needed elsewhere to meet Item 1.2. Also, note that these requirements can be met by using any available strategy, such as a raised-heel truss, alternate framing that provides adequate space, and / or high-density insulation.
15. Consistent with the 2009 IECC, slab edge insulation is only required for slab-on-grade floors with a floor surface less than 12 inches below grade. Slab insulation shall extend to the top of the slab to provide a complete thermal break. If the top edge of the insulation is installed between the exterior wall and the edge of the interior slab, it shall be permitted to be cut at a 45-degree angle away from the exterior wall. Alternatively, the thermal break is permitted to be created using $\geq R-3$ rigid insulation on top of an existing slab (e.g., in a home undergoing a gut rehabilitation). In such cases, up to 10% of the slab surface is permitted to not be insulated (e.g., for sleepers, for sill plates). Insulation installed on top of slab shall be covered by a durable floor surface (e.g., hardwood, tile, carpet).
16. Where an insulated wall separates a garage, patio, porch, or other unconditioned space from the conditioned space of the house, slab insulation shall also be installed at this interface to provide a thermal break between the conditioned and unconditioned slab. Where specific details cannot meet this requirement, partners shall provide the detail to EPA to request an exemption prior to the home's certification. EPA will compile exempted details and work with industry to develop feasible details for use in future revisions to the program. A list of currently exempted details is available at: energystar.gov/slabeledge.



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17. Mass walls utilized as the thermal mass component of a passive solar design (e.g., a Trombe wall) are exempt from this Item. To be eligible for this exemption, the passive solar design shall be comprised of the following five components: an aperture or collector, an absorber, thermal mass, a distribution system, and a control system. For more information, see: energy.gov/sites/prod/files/guide_to_passive_solar_home_design.pdf.
- Mass walls that are not part of a passive solar design (e.g., CMU block or log home enclosure) shall either utilize the strategies outlined in Item 3.4 or the pathway in the assembly with the least thermal resistance, as determined using a method consistent with the 2013 ASHRAE Handbook of Fundamentals, shall provide $\geq 50\%$ of the applicable assembly resistance, defined as the reciprocal of the mass wall equivalent U-factor in the 2009 IECC Table 402.1.3. Documentation identifying the pathway with the least thermal resistance and its resistance value shall be collected by the Rater and any Builder Verified or Rater Verified box under Item 3.4 shall be checked.
18. Up to 10% of the total exterior wall surface area is exempted from the reduced thermal bridging requirements to accommodate intentional designed details (e.g., architectural details such as thermal fins, wing walls, or masonry fireplaces; structural details, such as steel columns). It shall be apparent to the Rater that the exempted areas are intentional designed details or the exempted area shall be documented in a plan provided by the builder, architect, or engineer. The Rater need not evaluate the necessity of the designed detail to certify the home.
19. If used, insulated siding shall be attached directly over a water-resistive barrier and sheathing. In addition, it shall provide the required R-value as demonstrated through either testing in accordance with ASTM C 1363 or by attaining the required R-value at its minimum thickness. Insulated sheathing rated for water protection can be used as a water resistant barrier if all seams are taped and sealed. If non-insulated structural sheathing is used at corners, the advanced framing details listed in Item 3.4.3 shall be met for those wall sections.
20. Steel framing shall meet the reduced thermal bridging requirements by complying with Item 3.4.1 of the Checklist.
21. Double-wall framing is defined as any framing method that ensures a continuous layer of insulation covering the studs to at least the R-value required in Item 3.4.1 of the Checklist, such as offset double-stud walls, aligned double-stud walls with continuous insulation between the adjacent stud faces, or single-stud walls with 2x2 or 2x3 cross-framing. In all cases, insulation shall fill the entire wall cavity from the interior to exterior sheathing except at windows, doors and other penetrations.
22. All advanced framing details shall be met except where the builder, architect, or engineer provides a framing plan that encompasses the details in question, indicating that structural members are required at these locations and including the rationale for these members (e.g., full-depth solid framing is required at wall corners or interior / exterior wall intersections for shear strength, a full-depth solid header is required above a window to transfer load to jacks studs, additional jack studs are required to support transferred loads, additional cripple studs are required to maintain on-center spacing, or stud spacing must be reduced to support multiple stories in a multifamily building). The Rater shall retain a copy of the detail and rationale for their records, but need not evaluate the rationale to certify the home.
23. All exterior corners shall be constructed to allow access for the installation of $\geq R-6$ insulation that extends to the exterior wall sheathing. Examples of compliance options include standard-density insulation with alternative framing techniques, such as using three studs per corner, or high-density insulation (e.g., spray foam) with standard framing techniques.
24. Compliance options include continuous rigid insulation sheathing, SIP headers, other prefabricated insulated headers, single-member or two-member headers with insulation either in between or on one side, or an equivalent assembly. R-value requirement refers to manufacturer's nominal insulation value.
25. Insulation shall run behind interior / exterior wall intersections using ladder blocking, full length 2x6 or 1x6 furring behind the first partition stud, drywall clips, or other equivalent alternative.
26. In Climate Zones 6 - 8, a minimum stud spacing of 16 in. o.c. is permitted to be used with 2x6 framing if $\geq R-20.0$ wall cavity insulation is achieved. However, all 2x6 framing with stud spacing of 16 in. o.c. in Climate Zones 6 - 8 shall have $\geq R-20.0$ wall cavity insulation installed regardless of any framing plan or alternative equivalent total UA calculation.
27. Existing sill plates (e.g., in a home undergoing a gut rehabilitation) on the interior side of structural masonry or monolithic walls are exempt from this Item. In addition, other existing sill plates resting atop concrete or masonry and adjacent to conditioned space are permitted, in lieu of using a gasket, to be sealed with caulk, foam, or equivalent material at both the interior seam between the sill plate and the subfloor and the seam between the top of the sill plate and the sheathing.
28. In Climate Zones 1 through 3, a continuous stucco cladding system adjacent to sill and bottom plates is permitted to be used in lieu of sealing plates to foundation or sub-floor with caulk, foam, or equivalent material.
29. In Climate Zones 1 through 3, a continuous stucco cladding system sealed to windows and doors is permitted to be used in lieu of sealing rough openings with caulk or foam.
30. Examples of durable covers include, but are not limited to, pre-fabricated covers with integral insulation, rigid foam adhered to cover with adhesive, or batt insulation mechanically fastened to the cover (e.g., using bolts, metal wire, or metal strapping).
31. This Checklist is designed to meet the requirements of ASHRAE 62.2-2010 / 2013 / 2016, and ANSI / ACCA's 5 QI-2015 protocol, thereby improving the performance of HVAC equipment in new homes when compared to homes built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, and HVAC problems, (e.g., those caused by a lack of maintenance by occupants). Therefore, this Checklist is not a guarantee of proper ventilation, indoor air quality, or HVAC performance.
32. Track A – HVAC Grading shall not be used until an implementation schedule has been defined for ANSI / RESNET / ACCA Std. 310 by the HCO that the home is being certified under. Track A – HVAC Grading shall then use ANSI / RESNET / ACCA Std. 310 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO that the home is being certified under. For Track A, all unitary HVAC Systems including air conditioners and heat pumps up to 65 kBtuh and furnaces up to 125 kBtuh shall comply with 5a.1 through 5a.3 for the home to be certified.
33. If the non-invasive procedure in ANSI / RESNET / ACCA Std. 310 is not permitted to be used during the final inspection of a home (i.e., due to the equipment type or to outdoor air temperatures that do not meet the requirements of the non-invasive method), then the home is permitted to be certified with a default refrigerant charge designation of Grade III. Note that in these circumstances, the weigh-in method procedure in ANSI / RESNET / ACCA Std. 310 may still be used to pursue a Grade I designation.
34. If installed equipment does not match the National HVAC Design Report, then prior to certification the Rater shall obtain written approval from the designer (e.g., email, updated National HVAC Design Report) confirming that the installed equipment meets the requirements of the National



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HVAC Design Report. In addition, if "N/A" was selected for Item 1.2 of the National Rater Design Review Checklist, then the Rater shall verify that all installed equipment is an exempted type per Footnote 9 of that Checklist or, if not an exempted type, shall re-review the National Rater Design Review Checklist to ensure compliance with all requirements (e.g., contractor credential, full completion of HVAC Design Report, HVAC design tolerances).

In cases where the condenser unit is installed after the time of inspection by the Rater, the HVAC manufacturer and model numbers on installed equipment can be documented through the use of photographs provided by the HVAC Contractor after installation is complete.

35. The Rater shall measure and record the external static pressure in the return-side and supply-side of the system using the contractor-provided test locations. However, at this time, the Rater need not assess whether these values are within a specific range to certify the home.
36. Kinks are to be avoided and are caused when ducts are bent across sharp corners such as framing members. Sharp bends are to be avoided and occur when the radius of the turn in the duct is less than one duct diameter. Compression is to be avoided and occurs when flexible ducts in unconditioned space are installed in cavities smaller than the outer duct diameter and ducts in conditioned space are installed in cavities smaller than inner duct diameter. Ducts shall not include coils or loops except to the extent needed for acoustical control.
37. Item 6.2 does not apply to ventilation ducts, exhaust ducts, or non-ducted systems. For an HVAC system with a multi-speed fan, the highest design fan speed shall be used when verifying this requirement. For an HVAC system with multiple zones, this requirement shall be verified with all zones calling for heating or cooling simultaneously; additional testing of individual zones is not required. When verifying this requirement, doors separating bedrooms from the main body of the house (e.g., a door between a bedroom and a hallway) shall be closed and doors to rooms that can only be entered from the bedroom (e.g., a closet, a bathroom) shall be open. As an alternative to the ± 3 Pa limit, a Rater-measured pressure differential ≥ -5 Pa and $\leq +5$ Pa is permitted to be used for bedrooms with a design airflow ≥ 150 CFM. The Rater-measured pressure shall be rounded to the nearest whole number to assess compliance.
38. Item 6.3 does not apply to ducts that are a part of local mechanical exhaust and exhaust-only dwelling unit mechanical ventilation systems. EPA recommends, but does not require, that all metal ductwork not encompassed by Section 6 (e.g., exhaust ducts, duct boots, ducts in conditioned space) also be insulated and that insulation be sealed to duct boots to prevent condensation.
39. Items 6.4 and 6.5 generally apply to the ducts of space heating, space cooling, and dwelling unit mechanical ventilation systems.
However, visual inspection is permitted in lieu of testing for a dwelling unit mechanical ventilation system not connected to the space heating or space cooling system, regardless of the number of dwelling units it serves. In such cases, a Rater shall visually verify that all seams and connections are sealed with mastic or metal tape and all duct boots are sealed to floor, wall, or ceiling using caulk, foam, or mastic tape.
For duct systems requiring testing, duct leakage shall be determined and documented by a Rater using ANSI / RESNET / ICC Std. 380 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO that the home is being certified under. Leakage limits shall be assessed on a per-system, rather than per-home, basis.
40. For a duct system with three or more returns, the total Rater-measured duct leakage is permitted to be the greater of ≤ 6 CFM25 per 100 sq. ft. of CFA or ≤ 60 CFM25 at 'rough-in' or the greater of ≤ 12 CFM25 per 100 sq. ft. of CFA or ≤ 120 CFM25 at 'final'.
41. Note that compliance with Item 6.4.1 or 6.4.2 in conjunction with Section 4a of the National Rater Design Review Checklist automatically achieves Grade I total duct leakage per ANSI / RESNET / ACCA Std. 310.
42. Cabinets (e.g., kitchen, bath, multimedia) or ducts that connect duct boots to toe-kick registers are not required to be in place during the 'rough-in' test.
43. Registers atop carpets are permitted to be removed and the face of the duct boot temporarily sealed during testing. In such cases, the Rater shall visually verify that the boot has been durably sealed to the subfloor (e.g., using duct mastic or caulk) to prevent leakage during normal operation.
44. Testing of duct leakage to the outdoors can be waived in accordance with the 2nd or 3rd alternative of ANSI / RESNET / ICC Std. 301, Table 4.2.2 (1), footnote (w). Alternatively, testing of duct leakage to outdoors can be waived in accordance with Section 5.5.2 of ANSI / RESNET / ICC Std. 380 if total duct leakage, at rough-in or final, is ≤ 4 CFM25 per 100 sq. ft. of conditioned floor area or 40 CFM25, whichever is larger. Guidance to assist partners with these alternatives, including modeling inputs, is available at <http://www.energystar.gov/newhomesguidance>.
45. As defined by ANSI / RESNET / ICC Std. 301-2019, a Dwelling Unit Mechanical Ventilation System is a ventilation system consisting of powered ventilation equipment such as motor-driven fans and blowers and related mechanical components such as ducts, inlets, dampers, filters and associated control devices that provides dwelling-unit ventilation at a known or measured airflow rate.
46. Item 7.3 applies to any outdoor air inlet connected to a ducted return of the dwelling unit HVAC system, regardless of its intended purpose (e.g., for ventilation air, make-up air, combustion air). This Item does not apply to HVAC systems without a ducted return.
47. The Dwelling Unit Mechanical Ventilation System air flows and local exhaust air flows shall be determined and documented by a Rater using ANSI / RESNET / ICC Std. 380 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO that the home is being certified under.
48. For an attached dwelling unit, excluding units in dwellings (i.e., duplex) and townhomes, the override control is not required to be readily accessible to the occupant. However, in such cases, EPA recommends but does not require that the control be readily accessible to others (e.g., building maintenance staff) in lieu of the occupant.
49. For example, if an outdoor air inlet connected to a ducted return is used as a dedicated source of outdoor air for an exhaust ventilation system (e.g., bath fan), the outdoor airflow must be automatically restricted when the exhaust fan is not running and in the event of an override of the exhaust ventilation system.
50. When assessing the ventilation rate, the highest HVAC fan speed applicable to ventilation mode shall be used (e.g., if the inlet only opens when the HVAC is in 'fan-only' mode, then test in this mode). If the inlet has a motorized damper that only opens when the local mechanical kitchen exhaust is turned on, then testing is not required.

When required, the ventilation airflow through the inlet shall be measured and documented by a Rater using ANSI / RESNET / ICC Std. 380 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO that the home is being certified under. As an alternative, measurement of the outdoor airflow can be waived if a Constant Airflow Regulating



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(CAR) damper with a manufacturer-specified maximum flow rate no higher than 15 CFM or 15% above the ventilation design value is installed on the inlet.

51. Dwelling Unit Mechanical Ventilation System fans shall be rated for sound at no less than the airflow rate in Item 2.3 of the National HVAC Design Report. Fans exempted from this requirement include HVAC air handler fans, remote-mounted fans, and intermittent fans rated ≥ 400 CFM. To be considered for this exemption, a remote-mounted fan must be mounted outside the habitable spaces, bathrooms, toilets, and hallways and there shall be ≥ 4 ft. ductwork between the fan and intake grill. Per ASHRAE 62.2-2010, habitable spaces are intended for continual human occupancy; such space generally includes areas used for living, sleeping, dining, and cooking but does not generally include bathrooms, toilets, hallways, storage areas, closets, or utility rooms.
52. Note that the 'fan-on' setting of a thermostat would not be an acceptable controller because it would continuously operate the HVAC fan.
53. Bathroom fans with a rated flow rate ≥ 500 CFM are exempted from the requirement to be ENERGY STAR certified.
54. Ventilation air inlets that are only visible via rooftop access are exempted from Item 7.7 and the Rater shall mark "N/A". The outlet and inlet of balanced ventilation systems shall meet these spacing requirements unless manufacturer instructions indicate that a smaller distance may be used. However, if this occurs the manufacturer's instructions shall be collected for documentation purposes.
55. Without proper maintenance, ventilation air inlet screens often become filled with debris. Therefore, EPA recommends, but does not require, that these ventilation air inlets be located so as to facilitate access and regular service by the occupant.
56. Known contamination sources include, but are not limited to, stacks, vents, exhausts, and vehicles.
57. Continuous bathroom local mechanical exhaust fans shall be rated for sound at no less than the airflow rate in Item 8.2. Intermittent bathroom and both intermittent and continuous kitchen local mechanical exhaust fans are recommended, but not required, to be rated for sound at no less than the airflow rate in Items 8.1 and 8.2. Per ASHRAE 62.2-2010, an exhaust system is one or more fans that remove air from the building, causing outdoor air to enter by ventilation inlets or normal leakage paths through the building envelope (e.g., bath exhaust fans, range hoods, clothes dryers). Per ASHRAE 62.2-2010, a bathroom is any room containing a bathtub, shower, spa, or similar source of moisture.
58. An intermittent mechanical exhaust system, where provided, shall be designed to operate as needed by the occupant. Control devices shall not impede occupant control in intermittent systems.
59. 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. In addition, the continuous kitchen exhaust rate shall be ≥ 25 CFM, per 2009 IRC Table M1507.3, regardless of the rate calculated using the kitchen volume. Cabinet volume shall be included in the kitchen volume.
60. Homes shall meet this Item. Alternatively, the prescriptive duct sizing requirements in Table 5.3 of ASHRAE 62.2-2010 / 2013 / 2016 are permitted to be used for kitchen exhaust fans based upon the rated airflow of the fan at 0.25 IWC. If the rated airflow is unknown, ≥ 6 in. smooth duct shall be used, with a rectangular to round duct transition as needed. Guidance to assist partners with these alternatives is available at <http://www.energystar.gov/newhomesguidance>. As an alternative to Item 8.1, homes are permitted to use a continuous kitchen exhaust rate of 25 CFM per 2009 IRC Table M1507.3, if they are either a) PHIUS+ or PHI certified, or b) provide both dwelling unit ventilation and local mechanical kitchen exhaust using a balanced system, and have a Rater-verified whole-building infiltration rate ≤ 1.0 ACH50 or ≤ 0.05 CFM50 per sq. ft. of Enclosure Area, and a Rater-verified dwelling unit compartmentalization rate ≤ 0.30 CFM50 per sq. ft. of Enclosure Area if multiple dwelling units are present in the building. 'Enclosure Area' is defined as the area of the surfaces that bound the volume being pressurized / depressurized during the test.
61. All intermittent kitchen exhaust fans must be capable of exhausting at least 100 CFM. In addition, if the fan is not part of a vented range hood or appliance-range hood combination (i.e., if the fan is not integrated with the range), then it must also be capable of exhausting ≥ 5 ACH, based on the kitchen volume.
62. Based upon ASHRAE 62.2-2010, ducted mechanical systems are those that supply air to an occupiable space with a total amount of supply ductwork exceeding 10 ft. in length and through a thermal conditioning component, except for evaporative coolers. Systems that do not meet this definition are exempt from this requirement. While filters are recommended for mini-split systems, HRV's and ERV's, these systems, ducted or not, typically do not have MERV-rated filters available for use and are, therefore, also exempted under this version of the requirements. HVAC filters located in the attic shall be considered accessible to the occupant if either 1) drop-down stairs, a pull-down ladder, or door provide access to attic and a permanently installed walkway has been provided between the attic access location and the filter or 2) the filter location enables arm-length access from a portable ladder without the need to step into the attic and the height of the ceiling access panel or the bottom of the wall access panel where access is provided is ≤ 12 ft.
63. Sealing mechanisms comparable to a gasket are also permitted to be used. The filter media box (i.e., the component in the HVAC system that houses the filter) may be either site-fabricated by the installer or pre-fabricated by the manufacturer to meet this requirement. These requirements only apply when the filter is installed in a filter media box located in the HVAC system, not when the filter is installed flush with the return grill.
64. The pressure boundary is the primary enclosure boundary separating indoor and outdoor air. For example, a volume that has more leakage to outside than to conditioned space would be outside the pressure boundary.
65. Per the 2009 International Mechanical Code, a direct-vent appliance is one that is constructed and installed so that all air for combustion is derived from the outdoor atmosphere and all flue gases are discharged to the outside atmosphere; a mechanical draft system is a venting system designed to remove flue or vent gases by mechanical means consisting of an induced draft portion under non-positive static pressure or a forced draft portion under positive static pressure; and a natural draft system is a venting system designed to remove flue or vent gases under nonpositive static vent pressure entirely by natural draft.
66. This item only applies to furnaces, boilers, and water heaters located within the home's pressure boundary. Naturally drafted equipment is allowed within the home's pressure boundary in Climate Zones 1-3 if the Rater has followed ANSI / ACCA 12 QH-2014, Section 3.2.2, Appendix A Sections A2.2.6, A3 (Carbon Monoxide Test), A4 (Depressurization Test for the Combustion Appliance Zone), and verified that the equipment meets the limits defined within.
67. This item only applies to fireplaces located within the home's pressure boundary. Naturally drafted fireplaces are allowed within the home's pressure boundary if the Rater has verified that the total net rated exhaust flow of the two largest exhaust fans (excluding summer cooling fans)



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is ≤ 15 CFM per 100 sq. ft. of occupiable space when at full capacity. If the net exhaust flow exceeds the allowable limit, it shall be reduced or compensating outdoor airflow provided. Per ASHRAE 62.2-2010, the term "net rated exhaust flow" is defined as flow through an exhaust fan minus the compensating outdoor airflow through any supply fan that is interlocked to the exhaust fan. Per ASHRAE 62.2-2010, the term "occupiable space" is defined as any enclosed space inside the pressure boundary and intended for human activities, including, but not limited to, all habitable spaces, toilets, closets, halls, storage and utility areas, and laundry areas. See Footnote 51 for the definition of "habitable spaces".

68. The minimum volume of combustion air required for safe operation by the manufacturer and / or code shall be met or exceeded. Also, in accordance with the National Fuel Gas Code, ANSI Z223.1 / NFPA54, unvented room heaters shall not be installed in bathrooms or bedrooms.

ENERGY STAR®

Residential New Construction Programs

Historical Document

This document is provided for reference because it has been superseded by a more recent Version or Revision. Please find current program documents on the [Program Requirements](#) webpage.

Use of older Versions and Revisions, such as this document, are typically limited to homes and buildings with a permit date (or, for manufactured homes, a production date) prior to a specified date. Consult the [Implementation Timeline](#) table to assess whether a home or apartment is still eligible to be certified using this document.

For questions or more information, contact us at energystarhome@energystar.gov.



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National HVAC Design Report, Version 3 / 3.1 (Rev. 11) ¹

HVAC Designer Responsibilities:

- Complete one National HVAC Design Report for each system design for a house plan, created for either the specific plan configuration (i.e., elevation, option, orientation, & county) of the home to be certified or for a plan that is intended to be built with different configurations (i.e., different elevations, options, and/or orientations). Visit www.energystar.gov/newhomeshvacdesign and see Footnote 2 for more information. ²
- Obtain efficiency features (e.g., window performance, insulation levels, and infiltration rate) from the builder or Rater. ³
- Provide the completed National HVAC Design Report to the builder or credentialed HVAC contractor and to the Rater.

1. Design Overview

1.1 Designer name: _____ Designer company: _____ Date: _____

1.2 Select which party you are providing these design services to: ☐ Builder or ☐ Credentialed HVAC contractor

1.3 Name of company you are providing these design services to (if different than Item 1.1): _____

1.4 Area that system serves: ☐ Whole-house ☐ Upper-level ☐ Lower-level ☐ Other _____

1.5 Is cooling system for a temporary occupant load? ⁴ ☐ Yes ☐ No

1.6 House plan: _____ Check box to indicate whether the system design is site-specific or part of a group: ²

☐ Site-specific design. Option(s) & elevation(s) modeled: _____

☐ Group design. Group #: _____ out of _____ total groups for this house plan. Configuration modeled: _____

2. Dwelling Unit Mechanical Ventilation System Design ("Vent System") ^{5, 6, 7} & Inlets in Return Duct ⁸

Designer
Verified

Airflow:

2.1 Ventilation airflow design rate & run-time meet the requirements of ASHRAE 62.2-2010, 2013, or 2016. ⁹ ☐

2.2 Ventilation airflow rate required by 62.2 for a continuous system: _____ CFM -

2.3 Design for this system: Vent. airflow rate: _____ CFM Run-time per cycle: _____ minutes Cycle time: _____ minutes -

System Type & Controls:

2.4 Specified system type: ☐ Supply ☐ Exhaust ☐ Balanced -

2.5 Specified control location: _____ (e.g., Master bath, utility room) -

2.6 Specified controls allow the system to operate automatically, without occupant intervention. ☐

2.7 Specified controls include a readily-accessible ventilation override and a label has also been specified if its function is not obvious (e.g., a label is required for a toggle wall switch, but not for a switch that's on the ventilation equipment). ☐

2.8 For any outdoor air inlet designed to connect to a ducted return of the HVAC system, specified controls automatically restrict airflow using a motorized damper during ventilation off-cycle and occupant override. ^{8, 10} ☐

Sound: 2.9 The fan of the specified system is rated ≤ 3 sones if intermittent and ≤ 1 sone if continuous, or exempted. ¹¹ ☐

Efficiency:

2.10 If Vent System controller operates the HVAC fan, then HVAC fan operation is intermittent and either the fan type in Item 4.7 is ECM / ICM or the controls will reduce the run-time by accounting for HVAC system heating or cooling hours. ¹² ☐

2.11 If bathroom fans are specified as part of the system, then they are ENERGY STAR certified. ¹³ ☐

Air Inlet Location: (Complete this section if system has a specified air inlet location; otherwise check "N/A"). ¹⁴ ☐ N/A

2.12 Inlet pulls ventilation air directly from outdoors and not from attic, crawlspace, garage, or adjacent dwelling unit. ☐

2.13 Inlet is ≥ 2 ft. above grade or roof deck; ≥ 10 ft. of stretched-string distance from known contamination sources (e.g., stack, vent, exhaust, vehicles) not exiting the roof, and ≥ 3 ft. from known sources exiting the roof. ☐

3. Room-by-Room Heating & Cooling Loads ¹⁵

3.1 Room-by-room loads calculated using: ☐ Unabridged ACCA Manual J v8 ☐ 2013 ASHRAE Fundamentals ☐ Other per AHJ ¹⁶ -

3.2 Indoor design temperatures used in loads are 70°F for heating and 75°F for cooling. ☐

3.3 Outdoor design temperatures used in loads: (See Footnote 13 and energystar.gov/hvacdesigntemps) ¹⁷ -

County & State, or US Territory, selected: _____ Cooling season: _____ °F Heating season: _____ °F

3.4 Number of occupants used in loads: ¹⁸ _____ -

3.5 Conditioned floor area used in loads: ¹⁹ _____ Sq. Ft. -

3.6 Window area used in loads: ²⁰ _____ Sq. Ft. -

3.7 Predominant window SHGC used in loads: ²¹ _____ -

3.8 Infiltration rate used in loads: ²² Summer: _____ Winter: _____ -

3.9 Mechanical ventilation rate used in loads: _____ CFM -

Loads At Design Conditions (kBtuh)		N	NE	E	SE	S	SW	W	NW	
Cooling	3.10 Sensible heat gain (By orientation ²³):									-
	3.11 Latent heat gain (Not by orientation):									-
	3.12 Total heat gain (By orientation ²³):									-
	3.13 Maximum – minimum total heat gain (Item 3.12) across orientations = _____ kBtuh Variation is ≤ 6 kBtuh. ^{23, 24}									☐
Heating	3.14 Total heat loss (Not by orientation):									-



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4. Heating & Cooling Equipment Selection ¹⁵						Designer Verified
4.1 Equipment selected per ACCA Manual S (see Footnote 25 & 26). ^{25, 26}						☐
Air Conditioner / Heat Pump (Complete if air conditioner or heat pump will be installed; otherwise check "N/A")						☐ N/A
4.2 Equipment type: ☐ Cooling-only air conditioner or ☐ Cooling & heating heat pump						-
4.3 Condenser manufacturer & model: _____						-
4.4 Evaporator / fan coil manufacturer & model: _____						-
4.5 AHRI reference #: ²⁷ _____						-
4.6 AHRI listed efficiency: _____ / _____ EER / SEER Air-source heat pump: _____ HSPF Ground-source heat pump: _____ COP						-
4.7 Evaporator fan type: ☐ PSC ☐ ECM / ICM ☐ Other: _____						-
4.8 Compressor type: ☐ Single-speed ☐ Two-speed ☐ Variable-speed						-
4.9 Latent capacity at design conditions, from OEM expanded performance data: _____ kBtuh						-
4.10 Sensible capacity at design conditions, from OEM expanded performance data: _____ kBtuh						-
4.11 Total capacity at design conditions, from OEM expanded performance data: _____ kBtuh						-
4.12 Air-source heat pump capacity: At 17°F: _____ kBtuh At 47°F: _____ kBtuh ☐ N/A						-
4.13 Cooling sizing % = Total capacity (Item 4.11) divided by maximum total heat gain (Item 3.12): _____ %						-
4.14 Complete this Item if Condition B Climate will be used to select sizing limit in Item 4.15. Otherwise, check "N/A": ²⁸ ☐ N/A						-
4.14.1 Load sensible heat ratio = Max. sensible heat gain (Item 3.10) / Max. total heat gain (Item 3.12) = _____ %						
4.14.2 HDD / CDD ratio (Visit energystar.gov/hvacdesigntemps to determine this value for the design location) = _____						
4.15 Check box of applicable cooling sizing limit from chart below: ^{25, 26}						-
Equipment Type (Per Item 4.2) & Climate Condition (Per Item 4.14)		Compressor Type (Per Item 4.8)				
		Single-Speed	Two-Speed	Variable-Speed		
For Cooling-Only Equipment or For Cooling Mode of Heat Pump in Condition A Climate		☐ Recommended: 90 – 115% Allowed: 90 – 130%	☐ Recommended: 90 – 120% Allowed: 90 – 140%	☐ Recommended: 90 – 130% Allowed: 90 – 160%		
For Cooling Mode of Heat Pump in Condition B Climate		☐ 90% - 100%, plus 15 kBtuh	☐ 90% - 100%, plus 15 kBtuh	☐ 90% - 100%, plus 15 kBtuh		
4.16 Cooling sizing % (4.13) is within cooling sizing limit (4.15).						☐
Furnace (Complete if furnace will be installed; otherwise check "N/A").						☐ N/A
4.17 Furnace manufacturer & model: _____						-
4.18 Listed efficiency: _____ AFUE						-
4.19 Total capacity: _____ kBtuh						-
4.20 Heating sizing % = Total capacity (Item 4.19) divided by total heat loss (Item 3.14): _____ %						-
4.21 Check box of applicable heating sizing limit from chart below:						-
When Used for Heating Only		When Paired With Cooling				
☐ 100 – 140%		☐ Recommended: 100 – 140% Allowed: 100 – 400%				
4.22 Heating sizing % (4.20) is within heating sizing limit (4.21).						☐
5. Duct Design (Complete if heating or cooling equipment will be installed with ducts; otherwise check "N/A"). ¹⁵						☐ N/A
5.1 Duct system designed for the equipment selected in Section 4, per ACCA Manual D.						☐
5.2 Design HVAC fan airflow: ²⁹ _____ Cooling mode _____ CFM Heating mode _____ CFM						-
5.3 Design HVAC fan speed setting (e.g., low, medium, high): ³⁰ _____ Cooling mode _____ Heating mode _____						-
5.4 Design total external static pressure (corresponding to the mode with the higher airflow in Item 5.2): ³¹ _____ IWC						-
5.5 Room-by-room design airflows documented below (which must sum to the mode with the higher airflow in Item 5.2): ^{32, 33}						-
Room Name	Design Airflow (CFM)	Room Name	Design Airflow (CFM)	Room Name	Design Airflow (CFM)	
1		12		23		
2		13		24		
3		14		25		
4		15		26		
5		16		27		
6		17		28		
7		18		29		
8		19		30		
9		20		31		
10		21		32		
11		22		Total for all rooms		



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Footnotes

1. This report is designed to meet ASHRAE 62.2-2010 / 2013 / 2016 and ANSI / ACCA's 5 QI-2015 protocol, thereby improving the performance of HVAC equipment in new homes when compared to homes built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, and HVAC problems (e.g., those caused by a lack of maintenance or occupant behavior). Therefore, system designs documented through the use of this report are not a guarantee of proper ventilation, indoor air quality, or HVAC performance.

This report applies to split air conditioners, unitary air conditioners, air-source heat pumps, and water-source (i.e., geothermal) heat pumps up to 65 kBtuh with forced-air distribution systems (i.e., ducts) and to furnaces up to 225 kBtuh with forced-air distribution systems (i.e., ducts). For all other permutations of equipment (e.g., boilers, mini-split / multi-split systems) and distribution systems, Section 1 and 2 are required and Sections 3 through 5 are recommended, but not required.

2. The report shall represent a single system design for a house plan. Check the box for "site-specific design" if the design was created for the specific plan configuration (i.e., elevation, option, orientation, and county) of the home to be certified. Check the box for "group design" if the design was created for a plan that is intended to be built with potentially different configurations (i.e., different elevations, options, and/or orientations). Regardless of the box checked, the system design as documented on this National HVAC Design Report must fall within the following tolerances for the home to be certified:

- Item 3.3: The outdoor design temperature used in loads are within the limits defined at energystar.gov/hvacdesigntemps.
- Item 3.4: The number of occupants used in loads is within ± 2 of the home to be certified.
- Item 3.5: The conditioned floor area used in loads is between 100 sq. ft. smaller and 300 sq. ft. larger than the home to be certified.
- Item 3.6: The window area used in loads is between 15 sq. ft. smaller and 60 sq. ft. larger than the home to be certified, or, for homes to be certified with >500 sq. ft. of window area, between 3% smaller and 12% larger.
- Item 3.7: The predominant window SHGC is within 0.1 of the predominant value in the home to be certified.
- Items 3.10 - 3.12: The sensible, latent, & total heat gain are documented for the orientation of the home to be certified.
- Item 3.13: The variation in total heat gain across orientations is ≤ 6 kBtuh.
- Item 4.16: The cooling sizing % is within the cooling sizing limit selected.

Provide the National HVAC Design Report to the party you are providing these design services to (i.e., a builder or credentialed HVAC contractor) and to the Rater. The report is only required to be provided once per system design, even if multiple homes are built using this design (e.g., in a production environment where the same plan is built multiple times, only one report is required). As long as a report has been provided that falls within these tolerances for the home to be certified, no additional work is required. However, if no report falls within these tolerances or if any aspect of the system design changes, then an additional report will need to be generated prior to certification.

Visit energystar.gov/newhomeshvacdesign for a tool to assist with group designs and for more information.

3. The term 'Rater' refers to the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater or Approved Inspector, as defined by ANSI / RESNET / ICC Standard 301, or an equivalent designation as determined by a Home Certification Organization (HCO); and, b) have attended and successfully completed an EPA-recognized training class. See www.energystar.gov/newhomestraining.
4. Check "Yes" if this system is to handle temporary occupant loads. Such a system may be required to accommodate a significant number of guests on a regular or sporadic basis and shall be handled by a supplemental cooling system (e.g., a small, single-package unit or split-coil unit) or by a system that can shift capacity from zone to zone (e.g., a variable volume system).
5. As defined by ANSI / RESNET / ICC Std. 301-2019, a Dwelling Unit Mechanical Ventilation System is a ventilation system consisting of powered ventilation equipment such as motor-driven fans and blowers and related mechanical components such as ducts, inlets, dampers, filters and associated control devices that provides dwelling-unit ventilation at a known or measured airflow rate.
6. The system shall have at least one supply or exhaust fan with associated ducts and controls. Local exhaust fans are allowed to be part of a Dwelling Unit Mechanical Ventilation System. Designers may provide supplemental documentation as needed to document the system design.
7. In "Warm-Humid" climates as defined by 2009 IECC Figure 301.1 (i.e., CZ 1 and portions of CZ 2 and 3A below the white line), it is recommended, but not required, that equipment be specified with sufficient latent capacity to maintain indoor relative humidity at $\leq 60\%$.
8. Item 2.8 applies to any outdoor air inlet connected to a ducted return of the dwelling unit HVAC system, regardless of its intended purpose (e.g., for ventilation air, make-up air, combustion air). This Item does not apply to HVAC systems without a ducted return. For example, if an outdoor air inlet connected to a ducted return is used as a dedicated source of outdoor air for an exhaust ventilation system (e.g., bath fan), the outdoor airflow must be automatically restricted when the exhaust fan is not running and in the event of an override of the exhaust ventilation system. Note that a Rater will generally measure the ventilation rate at the highest HVAC fan speed applicable to ventilation mode (e.g., if the inlet only opens when the HVAC is in 'fan-only' mode, it will be tested in this mode) to verify that it is ≤ 15 CFM or 15% above design value. As an alternative, measurement of the outdoor airflow can be waived if a Constant Airflow Regulating (CAR) damper with a manufacturer-specified maximum flow rate no higher than 15 CFM or 15% above the ventilation design value is installed on the inlet.
9. Airflow design rates and run-times shall be determined using ASHRAE 62.2-2010 or later. Designers are permitted, but not required, to use published addenda and/or the 2013 or 2016 version of the standard to assess compliance.
10. In addition, consult manufacturer requirements to ensure return air temperature requirements are met.
11. Dwelling Unit Mechanical Ventilation System fans shall be rated for sound at no less than the airflow rate in Item 2.3. Fans exempted from this requirement include HVAC air handler fans, remote-mounted fans, and intermittent fans rated ≥ 400 CFM. To be considered for this exemption, a remote-mounted fan must be mounted outside the habitable spaces, bathrooms, toilets, and hallways and there shall be ≥ 4 ft. ductwork between the fan and intake grill. Per ASHRAE 62.2-2010, habitable spaces are intended for continual human occupancy; such space generally includes areas used for living, sleeping, dining, and cooking but does not generally include bathrooms, toilets, hallways, storage areas, closets, or utility rooms.
12. Note that the 'fan-on' setting of a thermostat would not be an acceptable controller because it would continuously operate the HVAC fan.
13. Bathroom fans with a rated flow rate ≥ 500 CFM are exempted from the requirement to be ENERGY STAR certified.



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14. Without proper maintenance, ventilation air inlet screens often become filled with debris. Therefore, EPA recommends, but does not require, that these ventilation air inlets be located so as to facilitate access and regular service by the occupant.
15. Homes certified through the Caribbean Program Requirements, Version 3, are exempt from completing Sections 3, 4, and 5 of this report.
16. Select "2013 ASHRAE Fundamentals" if using Chapter 17 of the 2013 ASHRAE Handbook of Fundamentals. Select "Other per AHJ" if the Authority Having Jurisdiction where the home will be certified mandates the use of a load calculation methodology other than Unabridged ACCA Manual J v8 or 2013 ASHRAE Fundamentals.
17. Visit energystar.gov/hvacdesigntemps for the maximum cooling season design temperature and minimum heating season design temperature permitted for ENERGY STAR Single-Family New Homes. For "County & State, or US Territory, selected", select the County and State or US Territory (i.e., Guam, Northern Mariana Islands, Puerto Rico, or US Virgin Islands), where the home is to be certified. The same design report is permitted to be used in other counties, as long as the design temperature limits in those other counties meet or exceed the cooling and heating season temperature limits for the county selected. For example, if Frederick County, VA, is used for the load calculations, with a 1% cooling temperature limit of 93 °F, then the same report could be used in Fairfax County (which has a higher limit of 94 °F) but not in Albemarle County (which has a lower limit of 92 °F). If a jurisdiction-specified design temperature is used that exceeds the limit in the Design Temperature Limit Reference Guide, designers must submit a Design Temperature Exception Request available at energystar.gov/hvacdesigntemps.
18. To determine the number of occupants among all HVAC systems in the home, calculate the number of bedrooms, as defined below, and add one. This number of occupants must be within ± 2 of the home to be certified, unless Item 1.5 indicates that the system is a cooling system for temporary occupant loads.

A bedroom is defined by ANSI / RESNET / ICC Standard 301-2014 as a room or space 70 sq. ft. or greater size, with egress window and closet, used or intended to be used for sleeping. A "den", "library", or "home office" with a closet, egress window, and 70 sq. ft. or greater size or other similar rooms shall count as a bedroom, but living rooms and foyers shall not.

An egress window, as defined in 2009 IRC section R310, shall refer to any operable window that provides for a means of escape and access for rescue in the event of an emergency. The egress window definition has been summarized for convenience. The egress window shall:

 - have a sill height of not more than 44 inches above the floor; AND
 - have a minimum net clear opening of 5.7 sq. ft., height of 24 in., and width of 20 in.; AND
 - be operational from the inside of the room without the use of keys, tools or special knowledge.
19. The difference between the Conditioned Floor Area (CFA) used in the design and the actual home to be certified must fall within the tolerance specified in Footnote 2, as verified by a Rater. Be advised, the Rater will calculate CFA using the definition in ANSI / RESNET / ICC Standard 301-2019, which defines this value, in part, as the floor area of the Conditioned Space Volume within a building or Dwelling Unit, not including the floor area of attics, crawlspaces, and basements below air sealed and insulated floors. See <https://codes.iccsafe.org/content/chapter/16185/> for the complete definition.
20. The difference between the window area used in the design and the actual home to be certified must fall within the tolerance specified in Footnote 2, as verified by a Rater. Be advised, the Rater will calculate window area using the on-site inspection protocol provided in Normative Appendix B of ANSI / RESNET / ICC Standard 301-2019, which instructs the Rater to measure the width and height of the rough opening for the window and round to the nearest inch, and then to use these measurements to calculate window area, rounding to the nearest tenth of a square foot. See <https://codes.iccsafe.org/content/chapter/16191/> for the complete protocol.
21. "Predominant" is defined as the SHGC value used in the greatest amount of window area in the home.
22. Infiltration rate shall reflect the value used in the confirmed or projected ERI rating for home to be certified. Alternatively, use "Average" or "Semi-loose" values for the cooling season infiltration rate and "Semi-tight" or "Average" values for the heating season infiltration rate, as defined by ACCA Manual J, Eighth Edition, Version Two.
23. Orientation represents the direction that the front door of the house is facing. The designer is only required to document the loads for the orientation(s) that the house might be built in. For example, if a house plan will only be built one time in a specific orientation (e.g., a site-specific design), then the designer only needs to document the loads for this one orientation.
24. Determine the orientation with the largest and smallest Total Heat Gain. Verify that the difference in Total Heat Gain between the orientation with the largest and smallest value is ≤ 6 kBtuh. If not, then assign the orientations into one or more groups until the difference is ≤ 6 kBtuh and then complete a separate National HVAC Design Report for each group.
25. Equipment shall be selected using the maximum total heat gain in Item 3.12 and the total heat loss in Item 3.14 per ACCA Manual S, Second Edition, except that cooling ranges above ACCA Manual S limits are temporarily allowed, per Item 4.15.
26. As an alternative for low-load spaces, a system match-up including a single-speed compressor with a total capacity ≤ 20 kBtuh is permitted to be used in spaces with a total cooling load ≤ 15 kBtuh. A system match-up including a two-speed or variable-speed compressor with a total capacity ≤ 25 kBtuh is permitted to be used in spaces with a total cooling load ≤ 18 kBtuh.
27. If an AHRI Reference # is not available, OEM-provided documentation shall be attached with the rated efficiency of the specific combination of indoor & outdoor components of the air conditioner or heat pump, along with confirmation that the components are designed to be used together.
28. Per ACCA Manual S, Second Edition, if the load sensible heat ratio is $\geq 95\%$ and the HDD/CDD ratio is ≥ 2.0 , then the Climate is Condition B, otherwise it is Condition A.
29. Design HVAC fan airflow is the design airflow for the blower in CFM, as determined using the manufacturer's expanded performance data.
30. Design HVAC fan speed setting is the setting on the control board (e.g., low, medium, high) corresponding to the Design HVAC fan airflow.
31. Design total external static pressure is the pressure corresponding to the Design HVAC fan airflow, inclusive of external components (e.g., evaporator coil, whole-house humidifier, or $\geq$ MERV 6 filter).
32. Designers may provide supplemental documentation with room-by-room and total design airflows in lieu of completing Item 5.5. Sample supplemental documentation can be found at <http://www.energystar.gov/newhomeshvacdesign>.
33. Orientation-specific room-by-room design airflows are recommended, but not required, to distribute airflow proportional to load, thereby improving comfort and efficiency.



ENERGY STAR Single-Family New Homes

National HVAC Commissioning Checklist, Version 3 / 3.1 (Rev. 11) ^{1, 2}

HVAC Commissioning Contractor Responsibilities:

- The commissioning contractor must be credentialed by an HVAC oversight organization to complete this checklist. One checklist must be completed and signed by the commissioning contractor for each HVAC system that is commissioned.
- The completed checklist for each commissioned system, along with the corresponding National HVAC Design Report, shall be retained by the contractor for a minimum of three years for quality assurance purposes. Furthermore, the contractor shall provide the completed checklist to the builder, the Rater ³ responsible for certifying the home, and the HVAC oversight organization upon request.
- Visit www.energystar.gov/newhomeshvac for information about the credential requirement and this checklist.

1. Commissioning Overview

1.1 Contractor name _____	Contractor company _____	Date _____	
1.2 Organization that your company is credentialed with:	☐ ACCA	☐ Advanced Energy	☐ NYSERDA
1.3 Builder client name: _____			
1.4 Home address: _____	City: _____	State: _____ Zip code: _____	
1.5 National HVAC Design Report corresponding to this system has been collected from designer or builder.		☐ Contractor-verified	
1.6 Area that system serves, per Item 1.4 of National HVAC Design Report: ☐ Whole-house ☐ Upper-level ☐ Lower-level ☐ Other _____			
1.7 House plan, per Item 1.6 of National HVAC Design Report: _____ ☐ Site-specific design ☐ Group design #: _____			

2. Refrigerant Charge - Run system for 15 minutes before testing. If outdoor ambient temperature at the condenser is $\leq 55^{\circ}\text{F}$ or, if known, below the manufacturer-recommended minimum operating temperature for the cooling cycle, then the system shall include a TXV, the outdoor temperature shall be recorded in Item 2.1, and the contractor shall check "N/A" in this Section. ⁴

	Contractor Verified	N/A
2.1 Outdoor ambient temperature at condenser: _____ $^{\circ}\text{F}$ DB	-	-
2.2 Return-side air temperature inside duct near evaporator, during cooling mode: _____ $^{\circ}\text{F}$ WB	-	☐
2.3 Liquid line pressure: _____ psig	-	☐
2.4 Liquid line temperature: _____ $^{\circ}\text{F}$ DB	-	☐
2.5 Suction line pressure: _____ psig	-	☐
2.6 Suction line temperature: _____ $^{\circ}\text{F}$ DB	-	☐

For System with Thermal Expansion Valve (TXV):

2.7 Condenser saturation temperature: _____ $^{\circ}\text{F}$ DB (Using Item 2.3)	-	☐
2.8 Subcooling value: _____ $^{\circ}\text{F}$ DB (Item 2.7 - Item 2.4)	-	☐
2.9 OEM subcooling goal: _____ $^{\circ}\text{F}$ DB	-	☐
2.10 Subcooling deviation: _____ $^{\circ}\text{F}$ DB (Item 2.8 - Item 2.9)	-	☐

For System with Fixed Orifice:

2.11 Evaporator saturation temperature: _____ $^{\circ}\text{F}$ DB (Using Item 2.5)	-	☐
2.12 Superheat value: _____ $^{\circ}\text{F}$ DB (Item 2.6 - Item 2.11)	-	☐
2.13 OEM superheat goal: _____ $^{\circ}\text{F}$ DB (Using superheat tables and Items 2.1 & 2.2)	-	☐
2.14 Superheat deviation: _____ $^{\circ}\text{F}$ DB (Item 2.12 - Item 2.13)	-	☐

2.15 Item 2.10 is $\pm 3^{\circ}\text{F}$ or Item 2.14 is $\pm 5^{\circ}\text{F}$

2.16 An OEM test procedure (e.g., as defined for a ground-source heat pump) has been used in place of the sub-cooling or super-heat process and documentation has been attached that defines this procedure.	☐	☐
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3. Indoor HVAC Fan Airflow

3.1 The mode with the higher design HVAC fan airflow used, per Item 5.2 of National HVAC Design Report: ☐ Heating ☐ Cooling	☐	-
3.2 Static pressure test holes have been created, and test hole locations are well-marked and accessible.	☐	-
Test hole location for return external static pressure: ☐ Plenum ☐ Cabinet ☐ Transition ☐ Other: _____	-	-
Test hole location for supply external static pressure: ☐ Plenum ☐ Cabinet ☐ Transition ☐ Other: _____	-	-
3.3 Measured return external static pressure (Enter value only, without negative sign): _____ IWC	-	-
3.4 Measured supply external static pressure (Enter value only, without positive sign): _____ IWC	-	-
3.5 Measured total external static pressure = Value-only from Item 3.3 + Value-only from Item 3.4 = _____ IWC	-	-
3.6 Measured (Item 3.5) - Design (Item 5.4 on National HVAC Design Report) total external static pressure = _____ IWC	-	-
3.7 Measured HVAC fan airflow, using Item 3.5 and fan speed setting: _____ CFM	-	-
3.8 Measured HVAC fan airflow (Item 3.7) is $\pm 15\%$ of design HVAC fan airflow (Item 5.2 on National HVAC Design Report).	☐	-

4. Air Balancing of Supply Registers & Return Grilles (Recommended, but not Required) ⁵

4.1 Balancing report attached with room-by-room design airflows from Item 5.5 on National HVAC Design Report, and contractor-measured airflow using ANSI / ACCA 5 QI-2015 protocol.	☐	☐
4.2 Room-by-room airflows verified by contractor to be within the greater of $\pm 20\%$ or 25 CFM of design airflow.	☐	☐



ENERGY STAR Single-Family New Homes

National HVAC Commissioning Checklist, Version 3 / 3.1 (Rev. 11) ^{1, 2}

Footnotes

1. This Checklist is designed to align with the requirements of ANSI / ACCA's 5 QI-2015 protocol, thereby improving the performance of HVAC equipment in new homes when compared to homes built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, and HVAC problems (e.g., those caused by a lack of maintenance or occupant behavior). Therefore, this Checklist is not a guarantee of proper ventilation, indoor air quality, or HVAC performance.

This Checklist applies to split air conditioners, unitary air conditioners, air-source heat pumps, and water-source (i.e., geothermal) heat pumps up to 65 kBtuh with forced-air distribution systems (i.e., ducts) and to furnaces up to 225 kBtuh with forced-air distribution systems (i.e., ducts). All other permutations of equipment (e.g., boilers, mini-split / multi-split systems) and distribution systems are exempt.
2. For a home certified in the State of ID, MT, OR, or WA, the following alternatives and exemptions apply:
 - a. For a home with an air-source heat pump up to 65 kBtuh with a forced-air distribution system (i.e., ducts), the contractor is permitted to complete the 2011 PTCS[®] Commissioned Heat Pump Certificate and Startup Form in lieu of this Checklist.
 - b. For a home with a split air conditioner or unitary air conditioner up to 65 kBtuh with a forced-air distribution system (i.e., ducts), the contractor is permitted to complete the Northwest Central AC Commissioning & Startup Form in lieu of this Checklist.
 - c. For a home in a location with < 600 CDD, the completion of this Checklist is recommended, but not required.
3. The term 'Rater' refers to the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater or Approved Inspector, as defined by ANSI / RESNET / ICC Standard 301, or an equivalent designation as determined by a Home Certification Organization (HCO); and, b) have attended and successfully completed an EPA-recognized training class. See www.energystar.gov/newhomestraining.
4. Either factory-installed or field-installed TXV's may be used. For field-installed TXV's, ensure that sensing bulbs are insulated and tightly clamped to the vapor line with good linear thermal contact at the recommended orientation, usually 4 or 8 o'clock.
5. Air balancing of supply registers and return grilles is highly recommended to improve the performance of the HVAC system and comfort of the occupants, but is not required at this time for certification. When air balancing is completed, balancing dampers or proper duct sizing shall be used instead of looped or coiled ductwork to limit flow to diffusers. When balancing dampers are used, they shall be located at the trunk to limit noise unless the trunk will not be accessible when the balancing process is conducted. In such cases, Opposable Blade Dampers (OBD) or dampers located in the duct boot are permitted to be used.



ENERGY STAR Certified Homes, Version 3 (Rev. 07)

Water Management System Builder Checklist^{1,2}

Home Address: _____ City: _____ State: _____ Zip Code: _____				
1. Water-Managed Site and Foundation	Must Correct	Builder Verified	Rater Verified	N/A
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. ³	☐	☐	☐	☐
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. ³	☐	☐	☐	☐
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 in. extruded polystyrene insulation with taped joints. ^{4, 5, 6}	☐	☐	☐	☐
1.4 Capillary break at all crawlspace floors using ≥ 6 mil polyethylene sheeting, lapped 6-12 in., & installed using one of the following opt's: ^{4, 5, 6}				
1.4.1 Placed beneath a concrete slab; OR,	☐	☐	☐	☐
1.4.2 Lapped up each wall or pier and fastened with furring strips or equivalent; OR,	☐	☐	☐	☐
1.4.3 Secured in the ground at the perimeter using stakes.	☐	☐	☐	☐
1.5 Exterior surface of below-grade walls of basements & unvented crawlspaces finished as follows: a) For poured concrete, masonry, & insulated concrete forms, finish with damp-proofing coating. ⁷ b) For wood framed walls, finish with polyethylene and adhesive or other equivalent waterproofing.	☐	☐	☐	☐
1.6 Class 1 vapor retarder not installed on interior side of air permeable insulation in ext. below-grade walls. ⁸	☐	☐	☐	☐
1.7 Sump pump covers mechanically attached with full gasket seal or equivalent.	☐	☐	☐	☐
1.8 Drain tile installed at the exterior side of footings of basement and crawlspace walls, with the top of the drain tile pipe below the bottom of the concrete slab or crawlspace floor. Drain tile surrounded with ≥ 6 in. of $\frac{1}{2}$ to $\frac{3}{4}$ in. washed or clean gravel and with gravel layer fully wrapped with fabric cloth. Drain tile level or sloped to discharge to outside grade (daylight) or to a sump pump. ⁹	☐	☐	☐	☐
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. ¹⁰	☐	☐	☐	☐
2.2 Fully sealed continuous drainage plane behind exterior cladding that laps over flashing in Item 2.1 and fully sealed at all penetrations. Additional bond-break drainage plane layer provided behind all stucco and non-structural masonry cladding wall assemblies. ^{10, 11}	☐	☐	☐	☐
2.3 Window and door openings fully flashed. ¹²	☐	☐	☐	☐
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 shingle-style with drainage plane above; boot / collar flashing at all roof penetrations. ¹³	☐	☐	☐	☐
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 discharges water on sloping final grade ≥ 5 ft. from foundation, or to underground catchment system not connected to the foundation drain system that discharges water ≥ 10 ft. from foundation. See Footnote for alternatives & exemptions. ^{4, 14}	☐	☐	☐	☐
3.3 Self-sealing bituminous membrane or equivalent at all valleys & roof deck penetrations. ⁴	☐	☐	☐	☐
3.4 In 2009 IECC Climate Zones 5 & 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. ⁴	☐	☐	☐	☐
4. Water-Managed Building Materials				
4.1 Wall-to-wall carpet <i>not</i> installed within 2.5 ft. of toilets, tubs, and showers.	☐	☐	☐	☐
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. ¹⁵	☐	☐	☐	☐
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. ⁸	☐	☐	☐	☐
4.4 Building materials with visible signs of water damage or mold <i>not</i> installed or allowed to remain. ¹⁶	☐	☐	☐	☐
4.5 Framing members & insulation products having high moisture content <i>not</i> enclosed (e.g., with drywall) ¹⁷	☐	☐	☐	☐
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: _____				

Notes:

1. The specifications in this Checklist are designed to help improve moisture control in new homes compared with homes built to minimum code. However, these features alone cannot prevent all moisture problems. For example, leaky pipes or overflowing sinks or baths can lead to moisture issues and negatively impact the performance of this Checklist's specified features.



ENERGY STAR Certified Homes, Version 3 (Rev. 07)

Water Management System Builder Checklist^{1,2}

2. Upon completion, the builder shall return the Checklist to the Rater for review. Alternatively, at the discretion of the builder and Rater, the Rater may verify any item on this Checklist. When this occurs, the Rater shall check the box of the verified items in the Rater Verified column. The Rater is only responsible for ensuring that the builder has completed the Builder Checklist in its entirety and for verifying the items that are checked in the Rater Verified column (if any). The Rater is not responsible for assessing the accuracy of the field verifications for items in this Checklist that are not checked in the Rater Verified column. Instead, it is the builder's exclusive responsibility to ensure the design and installation comply with the Checklist.
3. Swales or drains designed to carry water from foundation are permitted to be provided as an alternative to the slope requirements for any home, and shall be provided for a home where setbacks limit space to less than 10 ft. Also, tamping of back-fill is not required if either: proper drainage can be achieved using non-settling compact soils, as determined by a certified hydrologist, soil scientist, or engineer; OR, the builder has scheduled a site visit to provide in-fill and final grading after settling has occurred (e.g., after the first rainy season).
4. Not required in Dry (B) climates as shown in 2009 IECC Figure 301.1 and Table 301.1.
5. Not required for raised pier foundations with no walls. To earn the ENERGY STAR, EPA recommends, but does not require, that radon-resistant features be included in homes built in EPA Radon Zones 1, 2 & 3. For more information, see www.epa.gov/indoorairplus.
6. For an existing slab (e.g., in a home undergoing a gut rehabilitation), in lieu of a capillary break beneath the slab, a continuous and sealed Class I or Class II Vapor Retarder (per Footnote 8) is permitted to be installed on top of the entire slab. In such cases, up to 10% of the slab surface is permitted to be exempted from this requirement (e.g., for sill plates). In addition, for existing slabs in occupiable space, the Vapor Retarder shall be, or shall be protected by, a durable floor surface. If Class I Vapor Retarders are installed, they shall not be installed on the interior side of air permeable insulation or materials prone to moisture damage.
7. Interior surface of existing below-grade wall (e.g., in a home undergoing a gut rehab.) listed in Item 1.5a is permitted to be finished by:
 - Installing a continuous and sealed drainage plane, capillary break, Class I Vapor Retarder (per Footnote 8) and air barrier that terminates into a foundation drainage system as specified in Item 1.8; OR
 - If a drain tile is not required as specified in Footnote 9, adhering a capillary break and Class I Vapor Retarder (per Footnote 6) directly to the wall with the edges taped/sealed to make it continuous.

Note that no alternative compliance option is provided for existing below-grade wood-framed walls in Item 1.5b.

8. The 2009 IRC defines Class I vapor retarders as a material or assembly with a rating of ≤ 0.1 perm, as defined using the desiccant method with Procedure A of ASTM E 96. The following materials are typically rated at ≤ 0.1 perm and therefore shall not be used on the interior side of air permeable insulation in above-grade exterior walls in warm-humid climates or below-grade exterior walls in any climate: rubber membranes, polyethylene film, glass, aluminum foil, sheet metal, foil-faced insulating sheathings, and foil-faced non-insulating sheathings. These materials can be used on the interior side of walls if air permeable insulation is not present (e.g., foil-faced rigid foam board adjacent to a below-grade concrete foundation wall is permitted).

Note that this list is not comprehensive and other materials with a perm rating ≤ 0.1 also shall not be used. Also, if manufacturer specifications for a specific product indicate a perm rating above 0.1, then the material may be used, even if it is in this list. Also note that open-cell and closed-cell foam generally have perm ratings above this limit and may be used unless manufacturer specifications indicate a perm rating ≤ 0.1 . Several exemptions to these requirements apply:

- Class I vapor retarders, such as ceramic tile, may be used at shower and tub walls;
 - Class I vapor retarders, such as mirrors, may be used if mounted with clips or other spacers that allow air to circulate behind them.
9. Alternatively, either a drain tile that is pre-wrapped with a fabric filter or a Composite Foundation Drainage System (CFDS) that has been evaluated by ICC-ES per AC 243 are permitted to be used to meet this Item. Note that the CFDS must include a soil strip drain or another ICC-ES evaluated perimeter drainage system to be eligible for use. In an existing home (e.g., in a home undergoing a gut rehab.) a drain tile installed only on the interior side of the footings is permitted. Additionally, a drain tile is not required when a certified hydrologist, soil scientist, or engineer has determined that a crawlspace foundation, or an existing basement foundation (e.g., in a home undergoing a gut rehab.), is installed in Group I Soils (i.e. well-drained ground or sand-gravel mixture soils), as defined by 2009 IRC Table R405.1.
 10. These Items not required for existing structural masonry walls (e.g., in a home undergoing a gut rehabilitation). Note this exemption does not extend to existing wall assemblies with masonry veneers.
 11. Any of the following systems may be used: a monolithic weather-resistant barrier (i.e., house wrap) shingled at horizontal joints and sealed or taped at all joints; weather resistant sheathings (e.g., faced rigid insulation) fully taped at all "butt" joints; lapped shingle-style building paper or felts; or other water-resistive barrier recognized by ICC-ES or other accredited agency.
 12. Apply pan flashing over the rough sill framing, inclusive of the corners of the sill framing; side flashing that extends over pan flashing; and top flashing that extends over side flashing or equivalent details for structural masonry walls.
 13. Intersecting wall siding shall terminate 1 in. above the roof or higher, per manufacturer's recommendations. Continuous flashing shall be installed in place of step flashing for metal and rubber membrane roofs.
 14. The assessment of whether the soil is expansive or collapsible shall be completed by a certified hydrologist, soil scientist, or engineer. As an alternative, a roof design is permitted to be used that deposits rainwater to a grade-level rock bed with a waterproof liner and a lateral drain pipe that meets discharge requirements per Item 3.2. As another alternative, a rainwater harvesting system is permitted to be used that drains overflow to meet discharge requirements per Item 3.2.
 15. In addition to cement board, materials that have been evaluated by ICC-ES per AC 115 may also be used to meet this requirement. Monolithic tub and shower enclosures (e.g., fiberglass with no seams) are exempt from this backing material requirement unless required by the manufacturer. Paper-faced backerboard may only be used behind monolithic enclosures or waterproof membranes that have been evaluated by ICC-ES per AC 115, and then only if it meets ASTM mold-resistant standards ASTM D3273 or ASTM D6329.
 16. If mold is present, effort should be made to remove all visible signs of mold (e.g., by damp wipe with water and detergent). If removal methods are not effective, then the material shall be replaced. However, stains that remain after damp wipe are acceptable. Lumber with "sap stain fungi" is exempt from this Item as long as the lumber is structurally intact.
 17. For wet-applied insulation, follow manufacturer's drying recommendations. EPA recommends that lumber moisture content be $\leq 18\%$.