

## Normative Appendix A

### INSPECTION PROCEDURES FOR INSULATION GRADING AND ASSESSMENT

## DRAFT PDS-02

### BSR/RESNET/ICC 301-2014 Addendum N-201x, Minimum Rated Features

Revise existing definitions and add new definitions to Standard ANSI/RESNET/ICC 301-2014 as follows:

#### 3.2 Definitions

**Approved Inspector** – An individual who, by virtue of training and examination, has demonstrated competence in the performance of on-site inspections in accordance with requirements of Appendix A and Appendix B and who has been Approved by an Approved Rating Provider to conduct such tests.

**Approved Rating Provider** – An approved entity responsible for the approval of Approved Testers and Approved Inspectors and the certification of raters working under its auspices and who is responsible for the Quality Assurance of such Certified Raters and for the quality assurance of Energy Ratings produced by such Certified Raters.

**Approved Software Rating Tool** – A computerized procedure that is approved for the purpose of conducting Energy Ratings and calculating the annual energy consumption, annual energy costs and an Energy Rating Index for a home.

**Approved Tester** – An individual who, by virtue of training and examination, has demonstrated competence in the performance of on-site testing in accordance with requirements of Standard ANSI/RESNET/ICC 380 and who has been approved by an Approved Rating Provider to conduct such tests.

**Attached Dwelling Unit** – A Dwelling Unit sharing demising walls, floors, ceilings, or common corridors with another Dwelling Unit or Occupiable Space.

**Bedroom** – For Townhouses or buildings with one or two units, a room or space 70 square feet of floor area or greater, with egress window and closet, used or intended to be used for sleeping. A "den," "library," "home office" with a closet, egress window, and 70 square feet of floor area or greater or other similar rooms shall count as a Bedroom, but living rooms and foyers shall not. For all other Dwelling Units, a room or space used or intended to be used for sleeping. A Dwelling Unit where this space is also used as the primary living space shall still be counted as one bedroom.

**Chiller** – Vapor compression cooling equipment that uses the outdoor air or water circulated through a Cooling Tower as a heat sink for cooling and absorbs heat from conditioned space by means of a hydronic cold water distribution system.

**Compartmentalization Boundary** – The surface area that bounds the Infiltration Volume.

### **Conditioned Space Volume**

– The volume within a Dwelling Unit serviced by a space heating or cooling system designed to maintain space conditions at 78 °F (26 °C) for cooling and 68 °F (20 °C) for heating. The following specific spaces are addressed to ensure consistent application of this definition:

- If the volume both above and below a floor assembly meets this definition and is part of the Rated Dwelling Unit, then the volume of the floor assembly shall also be included. Otherwise the volume of the floor assembly shall be excluded.
  - Exception: The wall height shall extend from the finished floor to the bottom side of the floor decking above the Rated Dwelling Unit for non-top floor level Dwelling Units and to the exterior enclosure air barrier for top floor level Dwelling Units.
- If the volume of at least one of the spaces horizontally adjacent to a wall assembly meets this definition, and that volume is part of the Rated Dwelling Unit, then the volume of the wall assembly shall also be included. Otherwise, the volume of the wall assembly shall be excluded.
  - Exception: If the volume of one of the spaces horizontally adjacent to a wall assembly is a Dwelling Unit other than the Rated Dwelling Unit, then the volume of that wall assembly shall be evenly divided between both adjacent Dwelling Units.
- The volume of an attic that is not air sealed and insulated at the roof deck shall be excluded.
- The volume of a vented crawlspace shall be excluded.
- The volume of a garage shall be excluded, even when it is conditioned.
- The volume of a thermally isolated sunroom shall be excluded.
- The volume of an attic that is both air sealed and insulated at the roof deck, the volume of an unvented crawlspace, and the volume of a basement shall only be included if the volume is contiguous with the Rated Dwelling Unit and the party conducting evaluations has either:
  - Obtained an ACCA Manual J, S, and either B or D report and verified that both the heating and cooling equipment and distribution system are designed to offset the entire design load of the volume or

and distribution systems are designed to offset the entire design load of the volume, or,

- Verified through visual inspection that both the heating and cooling equipment and distribution system serve the volume and, in the judgement of the party conducting evaluations, are capable of maintaining the heating and cooling temperatures specified by the Thermostat section in Table 4.2.2(1).
- The volume of a mechanical closet, regardless of access location, that is contiguous with the Rated Dwelling Unit shall be included if:
  - it is serviced by a space heating or cooling system designed to maintain space conditions at 78 °F (26 °C) for cooling and 68 °F (20 °C) for heating, and
  - it only includes equipment serving the Rated Dwelling Unit, and
  - combustion makeup air is not intentionally provided from outside the Dwelling Unit, and
  - the mechanical room is not intentionally air sealed from the Rated Dwelling Unit

**Cooling Tower** – A heat rejection device that rejects heat to the atmosphere.

**Detached Dwelling Unit** – A Dwelling Unit that does not meet the definition of Attached Dwelling Unit.

**Drain Water Heat Recovery (DWHR)** – A heat exchanger unit that uses outgoing warm drain water to pre-heat incoming cold freshwater and is rated for efficiency and pressure loss according to CSA B55.1, and complies with CSA B55.2.

**Dwelling Unit** – A single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking, and sanitation.

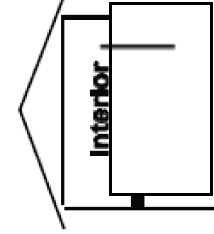
**Dwelling-Unit Mechanical Ventilation** – A mechanical exchange of indoor air with outdoor air throughout a Dwelling Unit, using a Balanced System, Exhaust System, Supply System, or combination thereof that is designed to operate continuously or through a programmed intermittent schedule to satisfy a Dwelling Unit ventilation rate.

**Exhaust Ventilation System (Exhaust System)** – One or more fans that remove air from the Dwelling Unit, causing outdoor air to enter by ventilation inlets or normal leakage paths through the Dwelling Unit envelope.

**Glazing** – Sunlight-transmitting Fenestration, including the area of sash, curbing or other framing elements, that enclose Conditioned Space Volume. For doors where the sunlight-transmitting opening is less than 50% of the door area, the glazing area of the sunlight transmitting opening area shall be used. For all other doors, the glazing area is the rough frame opening area for the door, including the door and the frame.

### **Infiltration Volume**

- The sum of the Conditioned Space Volume and additional adjacent volumes in the Dwelling Unit that meet the following criteria:
  - Crawlspace and floor assemblies above crawlspaces, when the access doors or hatches between the crawlspace and Conditioned Space Volume are open during the enclosure airtightness test,
  - Attics, when the access doors or access hatches between the attic and Conditioned Space Volume are open during the enclosure airtightness test,
  - Basements and floor assemblies above basements, where the doors between the basement and Conditioned Space Volume are open during the enclosure airtightness test.



**ms** – The heat gains within a home attributable to lights, people, hot water tanks, equipment, appliances, and Energy Loads internal to the Conditioned Space Volume.

**ted Features** – The characteristics of the building elements which are the basis for the calculation of end use energy consumption for the purpose of an Energy Rating, and which are evaluated by Certified Raters or Approved accordance with the on-site inspection procedures described in Appendix B, in order to collect the data necessary to create an Energy Rating using an Approved Software Rating Tool.

**Multifamily Buffer Boundary** – An unconditioned building space located directly adjacent to the Compartmentalization Boundary of the Dwelling Unit.

**Non-Freezing Space** – For modeling purposes, the temperature of this space shall float with outside temperature but no lower than 40°F. Applicable only in buildings containing multiple Dwelling Units.

**Quality Assurance** – The systematic processes intended to ensure reliable compliance with applicable standards.

**Qualifying Light Fixture Locations** – For the purposes of Energy Ratings, those light fixtures located within the contiguous area that is for the sole use of the Rated Home occupants, limited to kitchens, dining rooms, living rooms, family rooms/dens, bathrooms, hallways, stairways, entrances, bedrooms, garage, utility rooms, home offices, and all outdoor fixtures mounted on the exterior of the Rated Home or pole. This excludes plug-in lamps, closets, unconditioned basements, lighting for common spaces, parking lot lighting, and landscape lighting.

**Supply Ventilation System (Supply System)** – One or more fans that supply outdoor air to the Dwelling Unit. Supply Ventilation Systems shall be designed and constructed to provide ventilation air directly from the outdoors to the Dwelling Unit.

**Townhouse** – A single-family Dwelling Unit constructed in a group of three or more attached units in which each unit extends from the foundation to roof and with open space on at least two sides.

**Unconditioned Space Volume**– The volume within a building or Dwelling Unit that is not Conditioned Space Volume, but which contains heat sources or sinks that influence the temperature of the area or room. The following specific spaces are addressed to ensure consistent application of this definition:

- If either one or both of the volumes above and below a floor assembly is Unconditioned Space Volume, then the volume of the floor assembly shall be included.
- If the volume of both of the spaces horizontally adjacent to a wall assembly are Unconditioned Space Volume, then the volume of the wall assembly shall be included.
- The volume of an attic that is not both air sealed and insulated at the roof deck shall be included.
- The volume of a vented crawlspace shall be included.
- The volume of a garage shall be included, even when it is conditioned.
- The volume of a thermally isolated sunroom shall be included.
- The volume of an attic that is both air sealed and insulated at the roof deck, the volume of an unvented crawlspace, and the volume of a basement shall be included unless it meets the definition of Conditioned Space Volume.

**Uniform Energy Factor (UEF)** – DOE’s new standard for communicating the energy efficiency of water heaters, effectively replacing the Energy Factor.

**Unrated Conditioned Space** – A building location used only in Ratings of attached units, beyond the boundaries of the rated Dwelling Unit and serviced by a space heating or cooling system designed to maintain space conditions at 78 °F (26 °C) ± 5°F for cooling and 68 °F (20 °C) ± 5°F for heating. The energy for conditioning Unrated Conditioned Space is not counted in the Rated Home or Energy Rating Reference Home. This is distinct from Unrated Heated Space, and from Conditioned Space Volume.

**Unrated Heated Space** – A building location used only in ratings of attached units for shared service equipment such as shared laundry, heating, cooling, hot water, or ventilation. Unrated Heated Space is outside of the Conditioned Space Volume and only interacts with the Rated Home via the shared services located within. The energy for heating the Unrated Heated Space is not counted in the Rated Home or Energy Rating Reference Home.

**Variable Refrigerant Flow Multi-Split Air Conditioning and Heat Pump Equipment (VRF)** – Commercial-grade air conditioning or Heat Pumps with variable refrigerant flow that use the outdoor air as the heat source or sink (see also Heat Pump). The large outdoor units typically serve multiple Dwelling Units; indoor units can be ducted units, non-ducted units, or a mix of both.

**Water Loop Heat Pump (WLHP)** – Vapor compression heating and cooling equipment that uses externally supplied and/or conditioned water as the heat source when in heating mode or at the heat sink when in cooling mode (see also Heat Pump).

### **Revise section 3.3 Acronyms as follows:**

#### **3.3 Acronyms**

**AHRI**- Air Conditioning, Heating, and Refrigeration Institute

**DWHR** – Drain Water Heat Recovery

**IMEF** – Integrated Modified Energy Factor

**SHW** – Service Hot Water

**SL** – Standby Loss

**SRCC** – Solar Rating & Certification Corporation

**TE** – Thermal Efficiency

**UEF** – Uniform Energy Factor

**VRF** – Variable refrigerant flow

### **Revise the following sections of Standard ANSI/RESNET/ICC 301-2014**

**Table 4.2.2(1) Notes:**

(1) For a Rated Home with a non-storage-type water heater or where a shared water heater provides service hot water to the Rated Home, a 40-gallon storage-type water heater of the same fuel as the proposed water heater shall be assumed for the Energy Rating

Reference Home. For tankless water heaters with an Energy Factor, EF shall be multiplied by 0.92 for Rated Home calculations. For tankless water heaters with a Uniform Energy Factor, UEF shall be multiplied by 0.94 for Rated Home calculations. For a Rated Home without a proposed water heater, a 40-gallon storage-type water heater of the same fuel as the predominant fuel type used for the heating system(s) shall be assumed for both the Rated and Energy Rating Reference Homes. In both cases the Energy Factor of the water heater shall be as prescribed for the Energy Rating Reference Home water heater by Table 4.2.2(1).

(n) The Uniform Energy Factor (UEF) or Energy Factor (EF) shall be obtained for residential hot water equipment or the Uniform Energy Factor or Thermal Efficiency (TE) and Standby loss (SL) shall be obtained for commercial hot water equipment from manufacturer's literature or from AHRI directory for equipment being used, where available. For commercial water heaters, where EF or UEF is not available, an Approved commercial hot water system calculator shall be used to determine the EF or UEF.

Where a manufacturer provided or AHRI published EF or UEF is not available<sup>34</sup> for the residential hot water equipment, the guidance provided in i shall be used to determine the effective EF of the water heater. Where a manufacturer provided or AHRI published UEF, TE or SL is not available for commercial hot water equipment, the guidance provided in ii shall be used to determine the effective TE and SL of the water heater.

- i. For residential oil, gas, and electric water heaters or Heat Pumps, default EF values provided in Table 4.5.2(3) for age-based efficiency or Table 4.5.2(4) for non-age-based efficiency shall be used.
- ii. For commercial water heaters, values provided in Table C404.2 Minimum Performance of Water-Heating Equipment in the 2015 IECC shall be used.

**4.2.2.5.2.8 Clothes Dryers.** Clothes Dryer annual energy use for the Rated Home shall be determined in accordance with Equation 4.2-7 and shall be based on the clothes dryer located within the Rated Home. If no clothes dryer is located within the Rated Home, a clothes dryer in the nearest shared laundry room on the project site shall be used, if available for daily use by the occupants of the Rated Home. If the shared laundry room has multiple clothes dryers, the clothes dryer with the lowest EF or CEF shall be used.

$$\text{kWh/y} = 12.5 * (164 + 46.5 * \text{Nbr}) * \text{FU/EFdry} * (\text{CAPw/MEF} - \text{LER}/392) / (0.2184 * (\text{CAPw} * 4.08 + 0.24)) \quad (\text{Eq 4.2-7})$$

where:

Nbr = Number of Bedrooms in home

FU = Field Utilization factor = 1.18 for timer controls **or** 1.04 for moisture sensing

EFdry = Efficiency Factor of clothes dryer<sup>34</sup> **or** the default value of 3.01 **or** calculated as 1.15\*CEF.

CEF = Combined Energy Factor is the clothes dryer efficiency (lbs dry clothes/kWh) based on current U.S. DOE clothes dryer testing procedures.

CAPw = Capacity of clothes washer (ft<sup>3</sup>) from the manufacturer's data **or** the CEC Appliance Efficiency Database **or** the EPA ENERGY STAR website<sup>35</sup> **or** the default value of 2.874 ft<sup>3</sup>.

MEF = Modified Energy Factor of clothes washer from the Energy Guide label **or** the default value of 0.817 **or** calculated as 0.503+0.95\*IMEF.

IMEF = Integrated Modified Energy Factor, which has replaced MEF as the U.S. DOE Energy Factor test metric for clothes washers.

LER = Labeled Energy Rating of clothes washer (kWh/c) from the Energy Guide label **or** the default value of 704

For natural gas clothes dryers, annual energy use shall be determined in accordance with Equations 4.2-8a and 4.2-8b.

$$\text{Therms/y} = (\text{result of Eq. 4.2-7}) * 3412 * (1 - 0.07) \\ * (3.01 / \text{EFdry-g}) / 100000 \quad (\text{Eq. 4.2-8a}) \\ \text{kWh/y} = (\text{result of Eq. 4.2-7}) * 0.07 * (3.01 / \text{EFdry-g}) \quad (\text{Eq. 4.2-8b})$$

where:

EFdry-g = Efficiency Factor for gas clothes dryers or the default value of 2.67 or calculated as  $1.15 * \text{CEF} * \text{CEF}$  = Combined Energy Factor is the clothes dryer efficiency based on current U.S. DOE clothes dryer testing procedures.

For the purpose of adjusting the annual clothes dryer energy consumption for calculating the rating,  $\text{EUL}_{\text{LA}}$  shall be adjusted by  $\text{DEUL}_{\text{CD}}$ , which shall be calculated as the annual clothes dryer energy use derived by the procedures in this section minus the annual clothes dryer energy use derived for the Energy Rating Reference Home in Section 4.2.2.5.1, converted to MBtu/y, where  $\text{MBtu/y} = (\text{kWh/y}) / 293$  or  $(\text{therms/y}) / 10$ , whichever is applicable.

When a Dwelling Unit has no in-unit clothes dryer, and no shared clothes dryers are available in the building or on the project site for daily use by the Rated Home occupants or they exist, but the ratio of Dwelling Units to shared clothes dryers is greater than 8, the clothes dryer values from Table 4.2.2.5(1) shall be assumed for both the Energy Rating Reference Home and Rated Home.

For clothes dryer energy use, total Internal Gains in the Rated Home shall be modified by 15% of the clothes dryer  $\text{DEUL}_{\text{CD}}$  converted to Btu/day as follows:  $\text{DEUL}_{\text{CD}} * 10^6 / 365$ . Of this total amount, 90% shall be apportioned to sensible Internal Gains and 10% to latent Internal Gains. Internal Gains shall not be modified for clothes dryers located in Unconditioned Space Volume, Unrated Heated Space, Unrated Conditioned Space, or outdoor environment.

#### 4.2.2.5.2.11.2 Hot Water System Annual Energy Consumption

Service hot water energy consumption shall be calculated using Approved Software Tools and the provisions of Section 4.2.2.5.1.4, Section 4.2.2.5.2.11 and Section 4.2.2.5.2.11.1 shall be followed to determine appropriate inputs to the calculations.

If the Rated Home includes a hot water recirculation system either within the Dwelling Unit or in the form of a shared recirculation system serving multiple Dwelling Units, then the annual electric consumption of the recirculation pump shall be added to the total hot water energy consumption. The recirculation pump kWh/y shall be calculated using Equation 4.2-15a for recirculation systems located completely within the Dwelling Unit. The shared recirculation pump kWh/y shall be calculated using Equation 4.2-15b for shared recirculation systems serving multiple Dwelling Units.

$$\text{pump kWh/y} = \text{pumpW} * \text{Efact} \quad (\text{Eq. 4.2-15a})$$

where:

pumpW = pump power in Watts (default pumpW = 50 Watts)

Efact = factor selected from Table 4.2.2.5.2.11(5)

**Table 4.2.2.5.2.11(5) Annual electricity consumption factor for hot water recirculation system pumps**

Recirculation System Description	E <sub>fact</sub>
Recirculation without control or with timer control	8.76
Recirculation with temperature control	1.46
Recirculation with demand control (presence sensor)	0.15
Recirculation with demand control (manual)	0.10

$$\text{SharedHWpumpkWh/y} = \text{SHWP}_{\text{kW}} * \text{OpHrs}/\text{Ndweq} \quad (\text{Eq. 4.2-15b})$$

where:

SHWP<sub>kW</sub> = Shared HW pump power in kW. Convert HP to kW with the formula:

kW = HP x 0.746 / motor efficiency. If pump motor efficiency is unknown, use 0.85. If HP is unknown, use 0.25.

OpHrs = pump operating hours

= 2 hours per day for Demand Control \* 365

= 24 hours per day for No Control \* 365

N<sub>dweq</sub> = number of Dwelling Units served by the shared HW pump

Results from standard hot water energy consumption data (stdEC<sub>HW</sub>) shall be adjusted to account for the energy delivery effectiveness of the hot water distribution system in accordance with Equation 4.2-16.

$$\text{EC}_{\text{HW}} = \text{stdEC}_{\text{HW}} * (\text{E}_{\text{waste}} + 128) / 160 \quad (\text{Eq. 4.2-16})$$

where E<sub>waste</sub> is calculated in accordance with Equation 4.2-17.

$$\text{E}_{\text{waste}} = \text{oEW}_{\text{fact}} * (1 - \text{oCD}_{\text{eff}}) + \text{sEW}_{\text{fact}} * \text{pEratio} \quad (\text{Eq. 4.2-17})$$

where:

$$\text{oEW}_{\text{fact}} = \text{EW}_{\text{fact}} * \text{oFrac}$$

= standard operating condition portion of hot water energy waste where EW<sub>fact</sub> = energy waste factor

in accordance with Table 4.2.2.5.2.11(6)

oCD<sub>eff</sub> is in accordance with Section 4.2.2.5.2.11 sEW<sub>fact</sub> = EW<sub>fact</sub> - oEW<sub>fact</sub> = structural portion of

hot water energy waste

pEratio = piping length energy ratio

where

for standard system: pEratio = PipeL / refPipeL

for recirculation systems (entirely within the Rated Home):

$$\text{pEratio} = \text{LoopL} / \text{refLoopL}$$

and where

LoopL = hot water recirculation loop piping length including both supply and return sides of the loop,

measured longitudinally from plans, assuming the hot water piping does not run diagonally,

and refLoopL = hot water recirculation loop piping length for the Rated Home, measured longitudinally from plans, assuming the hot water piping does not run diagonally.



plus 20 feet of piping for each floor level greater than one plus 10 feet of piping for unconditioned basements.  
 $refLoopL = 2.0 * refPipeL - 20$

**Table 4.2.2.5.2.11(6) Hot water distribution system relative annual energy waste factors**

Distribution System Description	$EW_{fact}$
	No pipe insulation $\geq R-3$ pipe insulation
Standard systems	32.0 28.8
Recirculation without control or with timer control	500 250
Recirculation with temperature control	375 187.5
Recirculation with demand control (presence sensor)	64.8 43.2
Recirculation with demand control (manual)	43.2 28.8

**Table 4.5.2(1) Minimum Rated Features**

Building Element	Minimum Rated Feature
General Project Info	Total number of buildings, Dwelling Units, and total number of Bedrooms in the project.
1. Floor/Foundation Assembly	Construction type (slab-on-grade, crawlspace, basement), boundary condition (adiabatic, above unconditioned space, above Non-Freezing Space), dimensions, insulation type, value, and location (edge, under slab, cavity, sheathing), framing material and on-center spacing, insulation installation (Grade I, II, or III), vented or unvented (crawlspace), capacitance (if slab or basement receives appreciable solar gain).
2. Walls Assembly	Construction type, boundary condition (adiabatic, ambient, Multifamily Buffer Boundary), insulation value (cavity, sheathing), framing material and on-center spacing, insulation installation (Grade I, II, or III), capacitance, exterior color (light, medium, or dark).
3. Roof/Ceiling Assembly	Construction type, insulation value (cavity, sheathing), framing material and on-center spacing, insulation installation (Grade I, II, or III), framing covered by insulation or exposed, roof color (light, medium, or dark).
4. Rim/Band Joists or Floor Perimeters	Insulation value (cavity, sheathing).
5. Doors	Construction type, insulation value.
6. Windows	Construction type, orientation, U-value (of complete assembly), solar heat gain coefficient (of complete assembly), operable/inoperable, shading due to permanent, fixed shading devices attached to the building such as fins and overhangs. Window screens, security bars, balcony railings, movable awnings, roller

	shades, and shade from adjacent buildings, trees and shrubs shall not be included.
7.Skylights	Construction type, orientation, tilt, U-value (of complete assembly), solar heat gain coefficient (of complete assembly), shading.
8.Passive Solar System (Direct Gain System)	Solar type, collector type and area, orientation, tilt, efficiency, storage tank size, and pipe insulation value.
9. Air Leakage	Air leakage measurement and type (default estimate, blower door test), Infiltration Volume, Conditioned Space Volume.
10. Distribution System	System type, location, insulation value (duct and pipe), air leakage measurement and type (default estimate, duct pressurization).
11. Heating Equipment	Equipment type, location, capacity, efficiency (AFUE, HSPF, COP), Electric Auxiliary Energy (Eae), power rating of ground fluid circulating pump(s) for ground-loop and ground-water Heat Pumps, power rating of pumping system for shared boiler distribution.
12. Cooling Equipment	Equipment type, location, capacity, efficiency (SEER, COP, kW/ton), power ratings for the following: Cooling Tower (sprayer pump(s) and fan motor), outdoor system circulation loop pump, indoor system circulation loop pump and Cooling Tower fan/blower and circulation pump.
13. Control Systems	Thermostat type.
14. Service Hot Water Equipment	For Residential Equipment - Equipment type, location, Energy Factor or Uniform Energy Factor, extra tank insulation value, flow rates of showers and faucets.  For Commercial Equipment - Equipment type, location, Uniform Energy Factor or Thermal Efficiency and Standby Loss, extra tank insulation value, flow rates of showers and faucets.  Distribution Related: Distribution System Type (standard, recirculation), Recirculation System controls (none, timer, temperature, demand (manual) or demand (sensor)), pipe insulation value, pipe length for standard distribution, branch length for recirculation, supply + return loop length, pump power (Watts, HP).
15.Solar Domestic Hot Water Equipment	System type, collector type and area, orientation, tilt, efficiency, storage tank size, pipe insulation value.
16. Light Fixtures	Number of Qualifying Tier I, Tier II, and non-Qualifying Light Fixtures in Qualifying Light Fixture Locations within the contiguous

	<p>area that is for the sole use of the rated home occupants, including kitchens, dining rooms, living rooms, family rooms/dens, bathrooms, hallways, stairways, entrances, Bedrooms, garage, utility rooms, home offices, and all outdoor fixtures mounted on a building or pole. This excludes plug-in lamps, closets, unconditioned basements, lighting for common spaces, parking lot lighting, and landscape lighting.</p>
17. Refrigerator(s)	<p>Total annual energy consumption (kWh) for all refrigerators located within the Rated Home and/or any refrigerators outside the Rated Home for daily use by the Rated Home occupants as determined from either the refrigerator Energy Guide label or from age-based defaults as defined in Section 4.2.2.5.2.5.</p>
18. Dishwasher(s)	<p>Labeled Energy Factor (cycles/kWh) or labeled energy consumption (kWh/y) for all dishwashers located within the Rated Home and/or any dishwashers outside the Rated Home intended for daily use by the Rated Home occupants as defined in Section 4.2.2.5.2.9.</p>
19. Range/Oven	<p>Burner Energy Factor (BEF) and Oven Energy Factor (OEF) as defined in Section 4.2.2.5.2.7.</p>
20. Clothes Washer	<p>Location, source of hot water, type (residential or commercial); Labeled Energy Rating (kWh/y), electric rate (\$/kWh), annual gas cost (AGC), and gas rate (\$/therm) from Energy Guide label; and washer capacity (cubic feet) from manufacturer's data or the CEC Appliance Efficiency Database or the EPA ENERGY STAR website, for all clothes washers located within the Rated Home and/or any clothes washers in the building intended for use by the Rated Home occupants, as defined in Section 4.2.2.5.2.10.</p>
21. Clothes Dryer	<p>Location, clothes washer Modified Energy Factor(MEF) or Integrated Modified Energy Factor (IMEF) and clothes washer Labeled Energy Rating (kWh/y) from Energy Guide label; clothes washer capacity from manufacturer's data or CEC Appliance Efficiency Database or EPA ENERGY STAR website; and clothes dryer Efficiency Factor (EF) or Combined Efficiency Factor (CEF) from CEC Appliance Efficiency Database or EPA ENERGY STAR website, for all clothes dryers located in the Rated Home and/or any clothes dryers in the building intended for use by the Rated Home occupants, as defined in Section 4.2.2.5.2.8.</p>
22. Ceiling Fans	<p>Total number of ceiling fans in the Dwelling Unit, Labeled cfm, Watts and cfm/Watt at medium fan speed from each ceiling fan label.</p>
23. Dwelling-Unit Mechanical Ventilation system(s)	<p>Ventilation strategy (Supply, Exhaust, or Balanced), equipment type (individual or shared), daily run hours, measured exhaust airflow, measured supply airflow, system rated airflow, and fan wattage (a source is the Certified Home Ventilating Products Directory</p>

	available from the Heating and Ventilation Institute (HVI). Where shared systems occur, include percentage of outdoor air in supply air, rated exhaust airflow and rated supply airflow of the shared systems. Fan motor efficiency and horsepower are acceptable substitutes for fan wattage.
24. Systems pre-conditioning Ventilation Air	System type (heating, cooling, both), efficiency, fan power, system rated airflow.
25. On-site Power Production	System type, total annual kWh generation, and total site fuel used in the On-Site Power Production as derived from manufacturer's performance ratings.

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### INSPECTION PROCEDURES FOR MINIMUM RATED FEATURES

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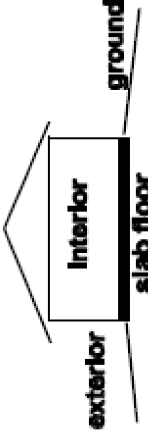
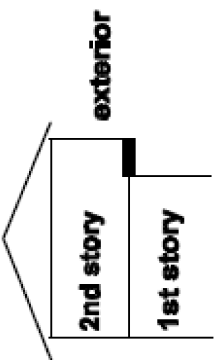
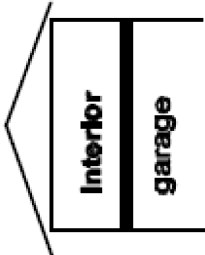
Dwelling Unit Mechanical Ventilation System(s) 54

Corridor Ventilation 56

On-Site Power Production 56

General	Task	On-Site Inspection Protocol
<p>Applies to <u>relevant</u> <del>all</del> Minimum Rated Features (MRF) <u>from</u> <u>Table 4.5.2(1)</u>.</p>	<p><u>Record</u> <u>Field</u> inspections and performance tests <del>shall</del> <u>be recorded</u>-by digital/electronic means</p> <p>All records shall be kept for a minimum of <u>5</u> years</p>	<p>Clearly document the following:</p> <ul style="list-style-type: none"> <li>- The <u>date</u> <u>and</u> <u>time</u> <u>of</u> the inspection/test <del>started and completed</del></li> <li>- The name of the Certified Rater, Approved Inspector, or Approved Tester conducting the inspection/test</li> <li>- <u>The Dwelling Unit being inspected/tested containing sufficient detail to indicate the location of the inspection, including the address or unit number of the inspected/tested Dwelling Unit</u></li> <li>- <u>If included in the Energy Rating and present in the Dwelling Unit, a minimum of <del>One</del> representative photo of each building element from Table 4.5.2(1) that is included in the Energy Rating items #2 (Wall Assembly); #3 (Roof/Ceiling Assembly); and either #11 (Heating Equipment), #12 (Cooling Equipment), or #14 (Service Hot Water Equipment) from Table 4.5.2(1) that reflect the reported data</u></li> <li>- <u>If testing is conducted in the Dwelling Unit, a photo of the recorded test results or a report generated by automated software that communicates with the testing device showing the test result</u></li> </ul> <p><del>Each photo and/or report shall be time/date stamped and geo-tagged. Where documentation is required to be recorded in this Appendix, that documentation shall include a photo.</del></p>

Building Element: Floor/Foundation Assembly		On-Site Inspection Protocol
Rated Feature	Task	
Gross Area and perimeter Surface-area and Perimeter	Measure floor/foundation dimensions	<p>For floors and slabs <del>on-grade</del>, measure dimensions of floor to calculate area.</p> <p>For slab-on-grade, also calculate total perimeter and perimeter exposed to other conditioned spaces.</p> <p>For conditioned basements and crawlspaces, measure dimensions of walls and floor to calculate area. Divide walls into above and below grade sections.</p> <p>Dimensions shall be measured <u>and rounded</u> to the nearest ½ foot, and the square footage calculated <u>and rounded</u> to the nearest square foot. Dimensions shall use exterior measurements starting at the exterior finished surface of the outside wall. Openings to the floor below shall not be included in the square footage calculation, except for stairways; stairways and associated landings are counted as square footage on both the starting and ending levels. The “footprint” of protruding chimneys or bay windows shall not be included. The “footprint” of other protrusions like a cantilever when it includes finished floor area shall be included. For Detached Dwelling Units, the square footage of separate finished areas that are connected to the main body of the house by conditioned hallways or stairways shall be included.</p> <p><u>Each unique floor exposure, construction type, and R-Value combination shall be calculated separately.</u></p>
Foundation Type	Determine whether foundation is a crawlspace or basement, and if it meets the criteria for Conditioned Space Volume, Unconditioned Space Volume, Unrated Conditioned Space, and/or Infiltration Volume.	<p>Use the definitions in Section 3 to determine whether a crawlspace or basement is Conditioned Space Volume, Unconditioned Space Volume, Unrated Conditioned Space, and/or Infiltration Volume.</p>
Floor type	Identify floor over crawlspace	<p>A crawlspace is a foundation condition <del>with unconditioned space underneath the home, between the floor joists and ground</del>, with a vertical dimension <del>between the floor joists and ground or slab that is less than 86 feet or less</del>.</p> <p>Vented crawlspaces have some form of vent or louver in the crawlspace walls; or are constructed in a manner such that air moves freely from outside the walls to inside the crawlspace. Unvented crawlspaces are constructed without any form of vents or louvers in the wall and are constructed to exclude air from outside the walls to inside the crawlspace. <u>Unvented crawlspaces may also be Conditioned Space Volume.</u></p>
	Identify slab on grade	A slab on grade is measured by the thickness of the slab on grade.

<p>Identify slab-on-grade floor/foundation</p>	<p>A slab-on-grade is recognized by the absence of either a crawlspace or basement. A slab-on-grade is constructed by pouring a concrete slab directly on the ground as the floor for the Dwelling Unit.</p> 
<p>Identify floor over full basement</p>	<p>A full basement has characteristics like an <b>unvented</b> crawlspace, except that the clear vertical dimension is greater than <b>46</b> feet.</p>
<p>Identify walkout basement</p>	<p>A walkout basement is a basement where a portion of the slab floor is on-grade and a portion is below grade.</p>
<p>Identify floor over exterior space</p>	<p>A floor that extends horizontally beyond the story below and is exposed to the exterior underneath is considered floor to exterior.</p> 
<p>Identify floor over garage</p>	<p>Identify floors over a garage.</p> 
<p>Identify floor of Attached Dwelling Unit over garage</p>	<p><del>The garage space</del> Where the floor of <u>beneath</u>-an Attached Dwelling Unit <u>is exposed to a garage space beneath it that is not shared with other Dwelling Units, that garage space shall be considered Unconditioned Space Volume.</u> <u>Otherwise, that floor of the Attached Dwelling Unit is facing one of the space types described in the next entry, unless it meets the criteria for Non-Freezing Space or Unrated-Conditioned Space:</u></p> <p><i>Non-Freezing Space</i>—the temperature of the garage or dropped ceiling plenum space is maintained at a temperature no lower than 40°F.</p> <p><i>Unrated-Conditioned Space</i>—the space directly below the Dwelling Unit is serviced by a heating or cooling system designed to maintain space conditions at 78 °F (26 °C) ± 5°F for cooling and 68 °F (20 °C) ± 5°F for heating.</p>
<p>Identify floor of Attached Dwelling Unit over</p>	<p><i>Floor above Multifamily Buffer Boundary</i> – The space directly below the Dwelling Unit has no heating or cooling system or the space is not designed to</p>

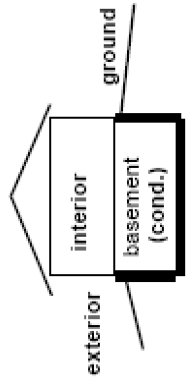


<p>Multifamily Builer Boundary, Unrated Conditioned Space, Unrated Heated Space, or Non-Freezing Space</p>	<p>maintain space conditions at <math>18 \sim 7^{\circ}\text{F}</math> (<math>26 \sim 20^{\circ}\text{C}</math>) <math>\pm 5 \sim 7^{\circ}\text{F}</math> for cooling and <math>68 \sim 70^{\circ}\text{F}</math> (<math>20 \sim 21^{\circ}\text{C}</math>) <math>\pm 5^{\circ}\text{F}</math> for heating.</p> <p><i>Floor above Unrated Conditioned Space</i> – The space directly below the Dwelling Unit is serviced by a heating or cooling system designed to maintain space conditions at <math>78^{\circ}\text{F}</math> (<math>26^{\circ}\text{C}</math>) <math>\pm 5^{\circ}\text{F}</math> for cooling and <math>68^{\circ}\text{F}</math> (<math>20^{\circ}\text{C}</math>) <math>\pm 5^{\circ}\text{F}</math> for heating.</p> <p><i>Floor above Unrated Heated Space</i> – The space directly below the Dwelling Unit is outside of the Conditioned Space Volume, and only interacts with the Rated Home via the shared services located within. This space is not cooled.</p> <p><i>Non-Freezing Space</i> – the temperature of the space directly below the Dwelling Unit varies with <u>outside temperature but is heated as necessary to stay at or above is maintained at a temperature no lower than 40°F.</u></p>
<p><u>Framing members</u></p>	<p><u>Determine the framing member size and spacing for framed floors at each floor exposure.</u></p> <p><u>When framing cannot be directly observed, check the framing by looking for an access through another part of the building or by looking at the rim space from the outside.</u></p>
<p>Interior surface condition</p>	<p><i>Covered</i> - Floors covered with wall-to-wall carpet are considered covered. Floors with only area rugs are not considered covered.</p> <p><i>Exposed</i> - Floors covered with tile, linoleum, vinyl, or wood are considered exposed.</p>
<p><u>Surface area and Perimeter</u></p>	<p><u>For floors and slab on grade, measure dimensions of floor to calculate area. For slab on grade, also calculate total perimeter and perimeter exposed to other conditioned spaces.</u></p> <p><u>For conditioned basements and crawlspaces, measure dimensions of walls and floor to calculate area. Divide walls into above and below grade sections.</u></p> <p><u>Dimensions shall be measured and rounded to the nearest 1/2 foot, and the square footage calculated and rounded to the nearest square foot. Dimensions shall use exterior measurements starting at the exterior finished surface of the outside wall. Openings to the floor below shall not be included in the square footage calculation, except for stairways, stairways and associated landings are counted as square footage on both the starting and ending levels. The "footprint" of protruding chimneys or bay windows shall not be included. The "footprint" of other protrusions like a cantilever when it includes finished floor area shall be included. For Detached Dwelling Units, the square footage of separate finished areas that are connected to the main body of the house by conditioned hallways or stairways shall be included.</u></p>

Foundation insulation

Determine type, grade, location, and thickness of foundation insulation and resultant R-Value

Use the inspection procedures in Normative Appendix A to determine the type and grade of ~~foundation insulation~~. Visually confirm location as interior or exterior, record R-value, and measure thickness. Visually confirm whether insulation product is installed for 100% of required area/perimeter and visually confirm and record R-value. Where R-Value cannot be determined during site observation If insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to determine the R-Value based on installed thickness.



If 100% of the area/perimeter of the foundation insulation cannot be visually confirmed, inspect according to the protocol below:

Visually confirm insulation product is installed for a minimum of 25% of the area/perimeter of the foundation insulation specified for insulation, and visually confirm and record R-value. Where R-Value cannot be determined during site observation If insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to determine the R-Value based on installed thickness. Use the inspection procedures in Normative Appendix A to determine the grade of insulation. The grade of the visually confirmed area shall be applied to the rest of the area unless photos show any additional deficiencies, in which case the grade recorded shall be the worst case documented.

Collect photos to confirm installation at several site locations and in sufficient detail to confirm thickness, type, and grade of the insulation installation. If foundation insulation cannot be visually verified immediately after installation, it may be verified through comprehensive photographs that comply with the requirements given above.

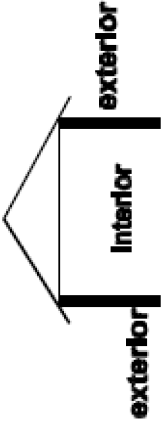
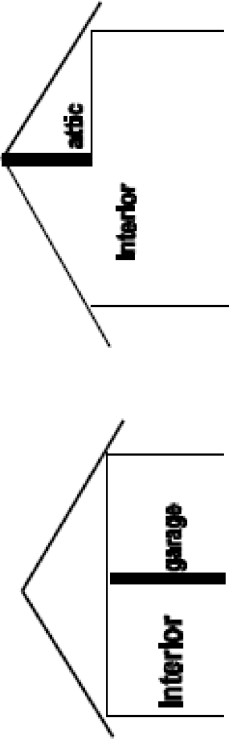
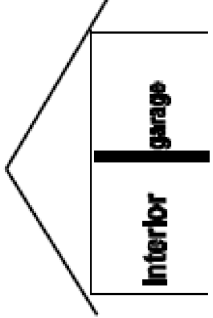
Floor insulation

Determine type, grade, and thickness of floor insulation and resultant R-Value

Use the inspection procedures in Normative Appendix A to determine the type and grade of floor insulation. For loose fill applications, multiply the thickness of the insulation in inches by the appropriate R-Value per inch based on the insulation type in order to calculate the total floor insulation R-value.

Slab-on-grade insulation	<p data-bbox="89 256 235 1915">Determine type, grade, <u>location</u>, and thickness of slab-on-grade insulation and resultant R-value</p> <p data-bbox="235 256 267 1915">Slab perimeter insulation is installed vertically, either on the outside of the slab extending above and/or below grade or between the foundation wall and the slab itself. Under slab insulation is installed horizontally, either along the slab perimeter or underneath the entire slab.</p> <p data-bbox="267 256 300 1915"><u>Slab insulation installation shall be verified as follows:</u></p> <p data-bbox="300 256 332 1915"><u>Use the inspection procedures in Normative Appendix A to determine the type and grade. Visually confirm location as horizontal or vertical, record R-Value, and measure thickness. Visually confirm whether insulation product is installed for 100% of required area/perimeter and visually confirm and record R-Value.</u></p> <p data-bbox="332 256 365 1915"><u>Where R-Value cannot be determined during site observation If insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to determine the R-Value based on installed thickness. Use the inspection procedures in Normative Appendix A to determine the grade of installation.</u></p> <p data-bbox="365 256 397 1915"><u>For Attached Dwelling Units with a shared slab foundation, if 100% of the area/perimeter of the shared slab insulation cannot be visually confirmed, inspect according to the protocol below:</u></p> <p data-bbox="397 256 430 1915">Visually confirm insulation product is installed for a minimum of 25% of the area/perimeter of the shared slab specified for insulation and visually confirm and record R-value. <u>Where R-Value cannot be determined during site observation If insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to determine the R-Value based on installed thickness. Use the inspection procedures in Normative Appendix A to determine the grade of installation.</u></p> <p data-bbox="430 256 462 1915">Collect photos to confirm installation at several site locations and in sufficient detail to confirm thickness, type, and grade of the insulation installation.</p> <p data-bbox="462 256 495 1915">Collect supporting documentation:</p> <ol data-bbox="495 256 544 1915" style="list-style-type: none"> <li data-bbox="495 256 527 1915">1. Proof of insulation purchase</li> <li data-bbox="527 256 544 1915">2. Photos of the following, where each photo is date-stamped and geo-tagged: <ol data-bbox="544 256 592 1915" style="list-style-type: none"> <li data-bbox="544 256 576 1915">a. Builder/installer photos of installation in non-verified areas</li> <li data-bbox="576 256 609 1915">b. Photos of delivered insulation that will be installed</li> <li data-bbox="609 256 641 1915">c. Photos of corners and other challenging details</li> </ol> </li> </ol> <p data-bbox="592 256 625 1915"><u>Under slab insulation cannot be assumed to exist unless visually verified by a photograph taken during or after installation, at chase way, at a sump opening,</u></p>
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or at plumbing penetrations. If slab insulation cannot be visually verified immediately after installation, it may be verified through comprehensive photographs that comply with the requirements given above.

Building Element: Walls <u>Assembly</u>	
Rated Feature	Task
Surface <u>Gross Area</u>	<p>Determine surface area of all walls</p> <p><u>On-Site Inspection Protocol</u></p> <p>Measure linear perimeter of the walls <u>and round</u> to the nearest ½ foot. Measure the interior wall height of the walls <u>and round</u> to the nearest ½ foot. Use these measurements to calculate surface area <u>and round</u> to the nearest square foot.</p> <p><u>Each unique wall exposure, construction type, and R-Value combination shall be calculated separately.</u></p>
Wall exposure	<p>Determine whether walls border exterior, Unconditioned Space Volume, Multifamily Buffer Boundary, Unrated Conditioned Space, Unrated Heated Space, Non-Freezing Space, or adjacent building</p> <p><i>Wall to exterior</i> – Walls border exterior space.</p>  <p><i>Wall to Unconditioned Space Volume</i> – Walls border Unconditioned Space Volume, as defined in Section 3.</p>  <p><i>Wall to Multifamily Buffer Boundary</i> – The space adjacent to the Dwelling Unit wall has no heating or cooling system or the space is not designed to maintain space conditions at 78 °F (26 °C) ± 5°F for cooling and 68 °F (20 °C) ± 5°F for heating.</p>  <p><i>Wall to Unrated Conditioned Space Volume</i> – The space adjacent to the Dwelling Unit wall is serviced by a heating or cooling system designed to maintain space conditions at 78 °F (26 °C) ± 5°F for cooling and 68 °F (20 °C) ± 5°F for heating.</p> <p><i>Wall to Unrated Heated Space</i> – The space adjacent to the Dwelling Unit wall</p>

		<p>is outside of the Conditioned Space Volume, and only interacts with the Rated Home via the shared services located within. This space is not cooled.</p> <p><u>Wall to Non-Freezing Space – The temperature of the space directly adjacent to the Dwelling Unit wall varies with outside temperature but is heated as necessary to stay at or above 40°F.</u></p> <p><u>Wall to Adjacent Building –</u> When a Dwelling Unit is directly adjacent to another building, the walls adjacent to that other building shall be considered exterior walls. However, if there is no air space present between the two buildings and the building that is adjacent is inspected and determined to meet the definition of Conditioned Space Volume, then the wall shall be considered adiabatic.</p>
Construction type	Determine the structural system of walls	<p><u>Wood framing –</u> Wood studs are typically located at 16" or 24" on center along the wall. <u>Measure and record the on-center spacing of the studs.</u></p> <p><u>Metal framing –</u> Steel studs are more common in construction over 5 stories.</p> <p><u>Masonry walls –</u> <u>Masonry walls</u> are load-bearing walls constructed of concrete or brick. A wood framed wall with brick veneer is not a masonry wall. <del>A CMU wall is also not a masonry wall.</del> Also record the siding or finish material on the exterior of the wall and if interior framing is present, record whether it is wood or metal.</p> <p><u>Foam core walls –</u> <u>Foam core walls</u> are a sandwich panel consisting of a foam center with outer layers of structural sheathing, gypsum board, or outer finish materials. Foam core panels may be structural or non-structural. Structural panels are also known as structural insulated panels (SIPs). Non-structural panels are frequently used in post and beam construction.</p> <p><u>Log walls –</u> <u>Log walls</u> are solid wood walls, using either milled or rough logs or solid timbers. Some homes have the appearance of solid log walls, yet are actually wood frame walls with siding that looks like solid logs inside and out. Some log walls are manufactured with insulated cores. Assume no added insulation exists in a log wall unless manufacturer's data sheet and/or a visual inspection confirms insulation type and thickness.</p>
Framing members	Determine the size of the framing members for all framed walls	<p>Where framing is visible: If insulation is in place, carefully probe depth using tape measure, wire probe, or foam insulation depth gauge while disturbing as little of the assembly as possible.</p> <p>Where framing is not visible:</p>

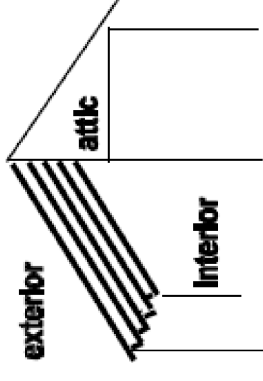
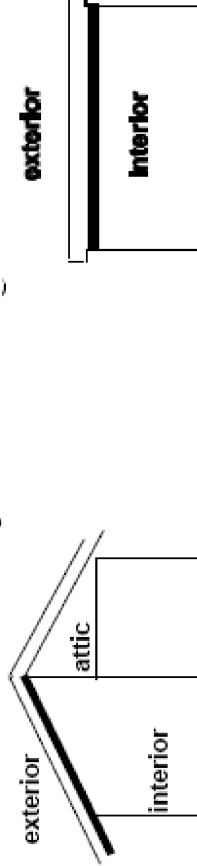
	<p>Measure the width of the window or door jambs;</p> <p>Subtract the widths of the wall coverings and sheathing materials<sup>1</sup>;</p> <p>Compare the remaining width to 3.5" for a 2x4 wall or 5.5" for a 2x6 wall;</p> <p>Where exposed garage walls exist, examine them for reference, although they will not always be the same as other walls;</p> <p>Where a wall does not come close to the framing width of a 2x4 or 2x6, inspect for continuous insulation on the inside or outside of the walls or look for "double stud" or "strapped" walls or other factors that account for a thickness greater than 5.5". For brick veneer walls, assume 4.5" - 5" for brick, airspace, and sheathing material.</p> <p>Check the framing member size on all sides of the Dwelling Unit. When an addition has been added, be sure to check the walls of the addition separately. Where the Dwelling Unit has more than one story, check the framing member size for each floor.</p>
<p><del>Cavity-Wall</del> insulation installation <del>R-Value</del></p>	<p>Use the inspection procedures in Normative Appendix A to verify the insulation type and grade of the insulation installed in the framed wall stud cavity. Visually confirm and record R-Value and measure thickness. <del>Where R-Value cannot be determined during site observation</del> <u>If insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to determine the R-Value based on installed thickness.</u></p> <p><del>Where cavity insulation is not visible:</del>  Check at plumbing outlet under sink or, in order of preference, remove cable outlet plate, telephone plate, electrical switch plates and/or electrical outlet plates on exterior walls. Probe the cavity around the exposed plate with a non-metal device. Determine type of insulation. Inspect outlets/switch plates on each side of the Dwelling Unit to verify that all walls are insulated.</p> <p>Multiply the wall framing member size in inches by the R-Value per inch. Use 3.5" for 2x4 walls and 5.5" for 2x6 walls constructed after 1945.</p> <p><del>Parts of the Dwelling Unit that were added later shall be checked separately from the original walls.</del></p>
<p><del>Continuous exterior</del> insulation <del>R-Value</del></p>	<p>Use the inspection procedures in Normative Appendix A to determine the insulation type and grade <del>of the continuous exterior insulation</del>. Visually confirm <del>whether</del> insulation product is installed for 100% of area specified for insulation and visually confirm and record R-Value and measure thickness. <del>Where R-Value cannot be determined during site observation</del> <u>If insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to</u></p>

	<p><u>determine the R-Value based on installed thickness.</u></p> <p><del>For Attached Dwelling Units with a shared exterior wall assembly, if 100% of the area of the exterior insulation cannot be visually confirmed, inspect according to the protocol below:</del></p> <p>Visually confirm insulation product is installed for a minimum of 25% of the area specified for insulation and visually confirm and record R-Value and measure thickness. <del>Where R-Value cannot be determined during site observation if insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to determine the R-Value based on installed thickness.</del> Use the inspection procedures in Normative Appendix A to determine the type and grade of insulation. The grade of the visually confirmed area shall be applied to the rest of the area unless photos show any additional deficiencies, in which case the grade recorded shall be the worst case documented.</p> <p><u>Photos to confirm installation at several site locations and in sufficient detail to confirm thickness, type, and grade of the insulation installation.</u></p> <p><u>Collect supporting documentation:</u></p> <ol style="list-style-type: none"> <li>1. <u>Proof of insulation purchase</u></li> <li>2. <u>Photos of the following, where each photo is date-stamped and geo-tagged:</u> <ol style="list-style-type: none"> <li>a. <u>Builder/Installer photos of installation in non-verified areas</u></li> <li>b. <u>Photos of delivered insulation that will be installed</u></li> <li>c. <u>Photos of corners and other challenging details.</u></li> </ol> </li> </ol> <p><u>If exterior insulation cannot be visually verified immediately after installation, it may be verified through comprehensive photographs that comply with the requirements given above.</u></p>
<p><u>Existing insulation in walls</u></p>	<p><u>Determine if wall insulation exists in existing Dwelling Unit</u></p> <p>Check at plumbing outlet under sink or, in order of preference, remove cable outlet plate, telephone plate, electrical switch plates and/or electrical outlet plates on exterior walls. Probe the cavity around the exposed plate with a non-metal device. Determine type of insulation. Inspect outlets/switch plates on each side of the Dwelling Unit to verify that all walls are insulated.</p> <p>Multiply the wall framing member size in inches by the R-Value per inch. Use 3.5" for 2x4 walls and 5.5" for 2x6 walls constructed after 1945.</p> <p><u>When an addition has been added, check the walls of the addition separately.</u></p> <p><u>Where the Dwelling Unit has one more than one story, check each floor.</u></p>
<p>Color</p>	<p>Identify the color of the walls as light, medium, or dark.</p>
<p>Thermal mass</p>	<p>Where the Dwelling Unit's walls are constructed of concrete, masonry, or brick</p>

	thickness of all mass walls	<p>(<u>other than brick veneer</u>), determine their type and thickness.</p> <p><u>Solid concrete walls (poured)</u> Measure the thickness of the poured concrete wall in inches.</p> <p><u>Concrete Masonry Unit</u> Measure the thickness of the wall in inches. Inspect for vermiculite or perlite insulation or other additional insulation.</p>
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<b>Building Element: Roof/Ceiling Assembly</b>		
<b>Rated Feature</b>	<b>Task</b>	<b>On-Site Inspection Protocol</b>
<u>Surface-Gross Area</u>	Obtain measurements of all roof/ceiling areas	<p>Measure the linear perimeter of the ceiling area <u>and round</u> to the nearest ½ foot and use these measurements to calculate surface area of the ceiling <u>and round</u> to the nearest square foot.</p> <p>When a ceiling area is vaulted, it is necessary to calculate dimensions geometrically.</p> <p><u>Each unique roof/ceiling exposure, construction type, and R-Value combination shall be calculated separately.</u></p>
Ceiling exposure	Determine ceiling exposure	<p>Identify the ceiling as one of the four following types.</p> <p><u>1. Ceiling to attic</u> When the ceiling has attic space above, even when the ceiling is vaulted, as in a scissor truss, it is considered “ceiling to attic.” Compare the vaulted ceiling angle against the angle of the roof. Where the ceiling angle is lower, there is attic space above the ceiling. Also check for an attic access, either separate or from an attic over another part of the building.</p> <div data-bbox="1153 903 1404 1239"> </div> <div data-bbox="1153 273 1404 735"> </div> <p><u>2. Ceiling to exterior</u> When the ceiling has no attic space above, even when the ceiling is flat, it is considered “ceiling to exterior.”</p>



<p>3. <u>Ceiling to Multifamily Buffer Boundary</u> When the ceiling of the <b>Attached</b> Dwelling Unit has non-exterior, non-attic space directly above that has no heating or cooling system or the space is not designed to maintain space conditions at 78 °F (26 °C) ± 5°F for cooling and 68 °F (20 °C) ± 5°F for heating, it is considered “ceiling to Multifamily Buffer Boundary.”</p>		
<p>4. <u>Ceiling to Unrated Conditioned Space</u> When the ceiling of the <b>Attached</b> Dwelling Unit has unrated space directly above, which may be another Dwelling Unit or another conditioned space in the building, that is conditioned by a heating or cooling system designed to maintain space conditions at 78 °F (26 °C) ± 5°F for cooling and 68 °F (20 °C) ± 5°F for heating, it is considered “ceiling to Unrated Conditioned Space.”</p>	<p>Framed ceilings fall into two categories.</p> <p><i>Roof on exposed beams or rafters</i> – when you look up from inside the room, you will see exposed beams or rafters.</p> 	<p>Determine ceiling construction type</p>
<p><i>Finished framed ceiling</i> – when a ceiling is framed, but you cannot see the framing because the ceiling is finished with drywall, plaster, or paneling, record it as a finished framed ceiling.</p> 	<p>Determine the framing member size <u>and spacing</u> for framed ceilings <u>at each ceiling exposure, exposed to unconditioned spaces</u>.</p> <p>When framing cannot be directly observed, check the framing by looking for an access through an attic over another part of the building or by looking at the rafters from the outside.</p>	<p>Determine the size of the framing members for all framed ceilings</p>
<p><b>Ceiling insulation R-value</b></p>	<p>Determine the insulation R-Value that exists in the attic/ceiling, <u>unless it is ceiling to Unrated Conditioned Space</u>. Use the following method for calculating</p>	<p>Determine type, grade, and thickness of insulation in</p>

	framed ceiling and/or attic and resultant R-value	<p>the overall ceiling R-value:</p> <ul style="list-style-type: none"> <li>● Use the inspection procedures in Normative Appendix A to determine the type and grade of the ceiling insulation present;</li> <li>● Record when the insulation is a combination of more than one type;</li> <li>● In the attic, measure the average depth in four places. Record whether the cavity insulation leaves the framing elements exposed, or covers them; when covered, record the thickness that covers the framing;</li> <li>● Multiply the R-Value of the material by the depth of the insulation.</li> </ul> <p>When there is no access to the attic or framed ceiling, a default <u>R-V</u> value shall be used based on current and historical local building practice and building code.</p>
Roof construction type	Determine roof construction type	Identify the type of roofing surface. Some common types include asphalt shingle, pebble/gravel built-up roof, tile roof, wood shingle roof, rubber roof/roof coating, or metal roof.
Roof color	Determine the color of the roof	Identify the color of the roof as light, medium, or dark. Also check for any reflective roof coating.
Roof deck insulation <b>R-value</b>	Determine type, grade, and thickness of roof deck insulation and resultant R-value	<p>Use the inspection procedures in Normative Appendix A to verify the insulation type and grade. Visually confirm <u>whether</u> insulation product is installed for 100% of required area and visually confirm and record R-Value and measure thickness. <u>Where R-Value cannot be determined during site observation</u> <u>If insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to determine the R-Value based on installed thickness.</u></p> <p><u>For Attached Dwelling Units with a shared roof, if 100% of the roof area cannot be visually confirmed, inspect according to the protocol below:</u></p> <p>Visually confirm insulation product is installed for a minimum of 25% of the area specified for insulation and visually confirm and record R-Value and measure thickness. <u>Where R-Value cannot be determined during site observation</u> <u>If insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to determine the R-Value based on installed thickness.</u></p> <p><u>For Attached Dwelling Units with a shared roof, if 100% of the roof area cannot be visually confirmed, inspect according to the protocol below:</u></p> <p>Visually confirm insulation product is installed for a minimum of 25% of the area specified for insulation and visually confirm and record R-Value and measure thickness. <u>Where R-Value cannot be determined during site observation</u> <u>If insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to determine the R-Value based on installed thickness.</u></p> <p><u>Use the inspection procedures in Normative Appendix A to determine the grade of insulation. The grade of the visually confirmed area shall be applied to the rest of the area unless photos show any additional deficiencies, in which case the grade recorded shall be the worst case documented.</u></p> <p><u>Collect photos to confirm installation at several site locations and in sufficient detail to confirm thickness, type, and grade of the insulation installation.</u></p> <p><u>Collect supporting documentation:</u></p> <ol style="list-style-type: none"> <li><u>1. Proof of insulation purchase</u></li> <li><u>2. Photos of the following, where each photo is date stamped and geo-tagged:</u></li> </ol>

- a. ~~Builder/Installer photos of installation in non-verified areas~~
- b. ~~Photos of delivered insulation that will be installed~~
- e. ~~Photos of corners and other challenging details~~

If roof deck insulation cannot be visually verified immediately after installation, it may be verified through comprehensive photographs that comply with the requirements given above.

<b>Building Element: Rim/Band Joists <del>and</del> Floor Perimeters</b>		
<b>Rated Feature</b>	<b>Task</b>	<b>On-Site Inspection Protocol</b>
<u>Rim/band joist</u> Insulation Installation	Inspect rim/band/floor perimeter insulation of Dwelling Unit during installation	<p>In wood-framed buildings, the rim joist is the band joist around the perimeter of the floor joists over a basement or crawlspace, or between 2 stories of the building. In other taller multistory buildings, these intermediate floor perimeters may be metal-framed or solid concrete.</p> <p>Use the inspection procedures in Normative Appendix A to determine the insulation type and grade of insulation. Measure the depth of insulation at the rim/band joist and between stories in a multistory building. <del>Where R-Value cannot be determined during site observation</del> <u>If insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to determine the R-Value based on installed thickness.</u></p>
Existing <u>Insulation in rim/band joists</u>	Determine if rim/band insulation exists in existing Dwelling Unit	<p><u>Crawlspace or Basement</u> From the basement or crawlspace, visually identify and measure the depth of insulation at the rim joist. Use the inspection procedures in Normative Appendix A to determine the grade of insulation.</p> <p><u>Between Stories</u> Look for access to the area from a garage or a utility access trap door. Visually identify and measure insulation where it exists. If no access is found, insulation is only assumed to exist at the rim joist between stories when:</p> <ul style="list-style-type: none"> <li>• Insulation was found at the rim joist at the top of the crawlspace or basement in the same building; and/ or</li> <li>• Insulation is found in the walls of the same building.</li> </ul> <p>Otherwise, assume no rim joist insulation exists.</p>

<b>Building Element: Doors</b>		
<b>Rated Feature</b>	<b>Task</b>	<b>On-Site Inspection Protocol</b>

Area	Determine area of doors	Measure the linear perimeter of the door and round to the nearest inch. Use these measurements to calculate the area of the door(s) and round to the nearest tenth of a square foot.  <u>Each unique door type and R-Value combination shall be calculated separately.</u>
Construction type	Determine construction type of doors	Determine whether the door(s) is fiberglass, metal, or wood by making a close inspection of its texture, inspecting its side view, or lock cut out. Alternatively, confirm by examining the door for a descriptive label or review the product manufacturer's data sheet.
Insulation	Determine <del>whether</del> doors <del>are insulated</del> <u>insulation value</u>	Determine <del>whether</del> the door(s) <del>is insulated</del> <u>U-Factor and, if applicable, SHGC</u> by examining the door for a descriptive label or review the product manufacturer's data sheet. Where insulation cannot be determined, default values shall be based on the local building code in effect at the time of construction.
Area	<u>Determine area of doors</u>	<u>Measure the linear perimeter of the door and round to the nearest inch. Use these measurements to calculate the area of the door(s) and round to the nearest tenth of a square foot.</u>
Presence of a door <u>seal sweep</u>	Inspect for the presence of a door <u>seal sweep</u> on the door where the blower door is installed	Identify the door where the blower door is to be setup for the airtightness test. Inspect <u>for the presence of a door seal installed to minimize air leakage between the door and door frame and document whether or not the door has an air impermeable door sweep installed. Document the presence, installation, quality, and condition of the door seal.</u>

Building Element: Windows	
Rated Feature	On-Site Inspection Protocol
Area	<p>Measure the width and height of the rough opening for the window <u>and round to the nearest inch</u>. Use these measurements to calculate window area, and <u>round record square footage</u> to the nearest tenth of a square foot.</p> <p>For existing homes or where the rough opening cannot be measured, window dimensions shall be measured from the outside edge of the window framing and include the width of the window frame.</p> <p><u>Each unique window type and U-value combination shall be calculated separately.</u></p>
Construction type	<p><u>Material</u></p> <p>Examine each window frame to determine the type of material used. Visually confirm whether the frame is made of metal, wood, or vinyl. Alternatively,</p>

	<p>confirm by examining the window for a descriptive label or review the product manufacturer's data sheet.</p> <p>Where a metal framed dual- or multiple-paned window is installed, determine if a thermal break is present by looking for two separated metal extrusions connected by a rubber spacer. Alternatively, confirm by reviewing the product manufacturer's data sheet.</p> <p>Determine and record the window cladding type. Check both the inside and outside, since some windows will have cladding on one side only.</p> <p><u>Glazing Type</u></p> <p>Determine and record whether the windows are single-paned, double-paned or multiple-paned. Determine and record whether <del>g</del>Glazing has a tint or low-e coating.</p> <p><del>Inspect all windows located in the Dwelling Unit and document which are operable and which are not.</del></p>
<u>Natural Ventilation</u>	<p><del>Determine whether or not there are operable windows in the Dwelling Unit</del></p>
Orientation	<p>Determine orientation of all windows and record orientation to the nearest cardinal/ordinal points. When using a compass while standing in front of a window inside the Dwelling Unit, record orientation while facing the exterior and adjust for magnetic deviation. When using a compass while standing outside the Dwelling Unit, record orientation while standing with back to the window and adjust for magnetic deviation.</p>
Shading	<p>Identify permanent, fixed shading devices attached to the building.</p> <p>Fins and overhangs shall be considered fixed shading devices. Window screens, security bars, balcony railings, movable awnings, roller shades, and shade from adjacent buildings, trees and shrubs shall not be considered fixed shading devices.</p> <p><u>Projections and Overhangs</u></p> <p>The shading impact of a projection or overhang is found by measuring the <u>length distance</u> of the overhang from the exterior wall surface, <del>and</del> the distance between the top of the window and the bottom edge of the overhang, <u>and the distance between the bottom of the window and the bottom edge of the overhang</u>.</p> <p>Measure the length of the overhangs over each exterior wall, to the nearest inch.</p> <p>Measure the <u>height distance between both the top of above</u> the window <u>and the bottom of the window</u> to the bottom edge of the overhang, to the nearest inch.</p>
Solar heat gain	<p>Look for an NFRC label on new windows; it will display SHGC. Where no</p>

coefficient	coefficient of Glazing	label is found, identify window in NFRC Certified Products Directory to determine SHGC or consult manufacturer's data sheet. If no SHGC is identified from window label, product literature, or NFRC directory, use the known window characteristics to select the SHGC from Table 10 in the ASHRAE Handbook of Fundamentals.
<del>U-value</del> <b>Factor</b>	Determine window U-value	Look for an NFRC label on new window; it will display full window U-value. Where no label is found, identify window in NFRC Certified Products Directory to determine U-value or consult manufacturer's data sheet. If no U-value is identified from window label, product literature, or NFRC directory, use the known window characteristics to select the U-value from Table 4 in ASHRAE Handbook of Fundamentals.
<del>Natural</del> <b>Ventilation</b>	<del>Determine whether or not there are operable windows in the Dwelling Unit</del>	<b>Inspect all windows located in the Dwelling Unit and document which are operable and which are not.</b>

<b>Building Element: Skylights</b>		
<b>Rated Feature</b>	<b>Task</b>	<b>On-Site Inspection Protocol</b>
Area	Determine area of skylights	See windows.
Construction type	Determine framing and Glazing characteristics of skylights	See windows.
Orientation	Determine orientation of skylights	Determine the orientation of the lower edge of the skylight. Use this direction as the orientation of the skylight.
Shading	Determine shading of skylights	See windows.
Solar heat gain coefficient	Determine solar heat gain coefficient of skylights	See windows.
<del>Tilt</del>	<del>Determine tilt of skylights</del>	<del>Measure the tilt of the skylight relative to horizontal. This may be done with a level and angle finder instrument, or geometrically with a protractor.</del>
<del>U-value</del> <b>Factor</b>	Determine skylight U-value	See windows.
<del>Tilt</del>	<del>Determine tilt of skylights</del>	<b>Measure the tilt of the skylight relative to horizontal. This may be done with a level and angle finder instrument, or geometrically with a protractor.</b>
		<b><u>If the pitch of the roof is known or can be measured, and if the skylight is in line with the roof, then the roof pitch may also be considered the tilt of the skylights.</u></b>

<b>Building Element: Passive Solar Heating System</b>		
<b>Rated Feature</b>	<b>Task</b>	<b>On-Site Inspection Protocol</b>

Direct gain	Identify system type and determine solar aperture orientation and aperture area	<p>Through proper sizing, placement, orientation, and/or control of windows, skylights, shading devices, and solar storage mass within the building, a solar direct gain system is designed to reduce heating, cooling, and lighting energy requirements.</p> <p>To determine aperture area, measure width and height of south-facing Glazing and indicate tilt angle. Record glass type(s) and presence of night insulation, when present.</p> <p>Determine orientation to the nearest cardinal/ordinal point.</p> <p>Determine the type of thermal mass, its thickness, and its dimensions.</p> <p>Determine whether the mass will be lit by direct solar rays between the hours of 9:00 a.m. and 3:00 p.m. during the winter. Record any trees or other obstructions to solar gain.</p>
Greenhouse or solarium	Identify system type and determine solar aperture orientation, aperture area, and information about thermal mass	<p>A greenhouse or solarium creates a South-glazed buffer zone between the Dwelling Unit and the exterior to help heat the living area.</p> <p>See Direct gain, above, for specific inspection items.</p>
Thermal storage mass	Identify system type and determine solar aperture orientation, aperture area, and information about thermal mass	<p>Thermal mass systems consist of solar-exposed heavyweight materials with high heat capacitance and relatively high conductance or high thermal diffusivity, that are placed in the same zones(s) as the solar collection area(s).</p> <p>Determine and record whether these elements are integral with the building or distinct elements within the building.</p> <p>Distinct components:  <i>Trombe wall</i> - uses a heat storage mass placed between the glass and the space to be heated. Measure area of storage mass, determine material, thickness, and capacitance.</p> <p><i>Water wall</i> - replaces the existing wall, or parts of it, with containers that hold water.</p>
Thermosiphon Air Panel (TAP)	Identify system type	<p><i>Thermosiphon air panel (TAP)</i> - has one or more Glazing layers made of glass or plastic, an air space, an absorber, another air space, and (often) an insulated backing. These are similar in appearance to active flat-plate collectors, often mounted vertically on walls, or ground-mounted, so that the living space is higher than the collector to facilitate convection from the TAP to the building.</p> <p>See Greenhouse, above, for specific inspection items.</p>

<b>Building Element: Air Leakage</b>	
<b>Rated Feature</b>	<b>On-Site Inspection Protocol</b>
Blower door test	Follow Procedure for Measuring Airtightness of Building or Dwelling Unit Enclosure in ANSI 380.
Infiltration Volume	Determine the Infiltration Volume by adding the Conditioned Space Volume and Unconditioned Space Volume in the Dwelling Unit, in accordance with the definitions.
Compartmentalization Boundary	Determine the Compartmentalization Boundary by calculating the surface area that bounds the Infiltration Volume.

<b>Building Element: Heating and Cooling Distribution System</b>	
<b>Rated Feature</b>	<b>On-Site Inspection Protocol</b>
System type	<p><i>Forced air</i> - a fan unit or air handler connected to ducts that supply heated or cooled air to multiple rooms in the Dwelling Unit. Forced air systems have supply and/or return ductwork.</p> <p><i>Unit heater/air conditioner</i> - heating or cooling is supplied directly from a heating or cooling device located within the space it serves. Unitary equipment<sup>2</sup>-has no supply or return ductwork.</p> <p><i>Forced hot water</i> - heated water is pumped through a series of radiator elements to supply heat. Identify and record the radiator elements as conventional radiators, baseboard "fin tube" radiators, cast iron baseboards, or radiant hot water panels located at the baseboards or on walls or ceilings.</p> <p><i>Hot water radiant system</i> - heated water is circulated through plastic or metal tubing that is installed in a concrete slab or finished floor or, occasionally, in walls or ceilings.</p> <p><i>Steam heating</i> - steam systems utilize a distribution system with cast iron radiators connected to a boiler that creates steam. The steam rises into the radiators through one set of pipes, condenses into water, and drains back to the boiler. There are 2 common system types:  One Pipe Steam - radiators have only one pipe connected with a shut off valve. There will also be an air vent on the opposite end of the radiator from the pipe connection.</p>



<p>two pipe steam - radiators will have a larger steam supply pipe and a smaller condensate return pipe. There will be a control valve on the steam side and a steam trap on the condensate side.</p> <p><i>Electric radiant system</i> - electric cables are installed in concrete floor slabs or in the ceiling. Electric current is passed through the cables, causing them to heat up, heating the floor, individual radiant wall panels, or the ceiling assembly, which radiates heat to the space.</p> <p><i>Baseboard electric resistance</i> - electric elements are installed in baseboard enclosures. Electric current is passed through the electric element to provide heat to the space.</p> <p><i>Electric unit heaters</i> - electric elements are enclosed in a cabinet with a blower that is suspended from the ceiling or mounted in a ceiling cavity, wall cavity, under a kitchen or bath cabinet (kickplate) or other areas. In multifamily buildings, look for these units in stairwells, storage rooms, mechanical rooms, water meter closets or any space with a small or low heating load.</p>		
<p>Locate and differentiate between supply and return ducts. The location of air ducts <b>and air handlers</b> shall be recorded as in attic space, crawlspace, basement, or other conditioned or unconditioned space. Use the definitions in Section 3 to classify the locations as Infiltration Volume, Conditioned Space Volume, Unconditioned Space Volume, or Unrated Conditioned Space. Approximate the percentage of both the supply and return ductwork in each area <b>Provide additional details</b> when supply/return ducts <b>and air handlers</b> are located in more than one area.</p>	<p>Determine the location of ducts <b>and air handler</b></p>	<p>Location of air ducts <b>and air handler</b></p>
<p><b>Record the horsepower and model number of any primary and secondary pumps associated with the distribution circulation loop, excluding any pumps on standby. Use the model number of the pumps to determine the pump motor efficiency from the manufacturer's data sheet. The number of Dwelling Units served by the circulation loop shall also be determined.</b></p>	<p>Determine the energy use of the distribution pumps</p>	<p>Circulation Pumps</p>
<p>Inspect the ducts or pipes to confirm they are insulated and look for labeling printed on the insulation by the manufacturer. Record R-value. Where insulation is not marked with the R-value, identify type and measure the thickness of the insulation to determine R-value.</p>	<p>Determine the R-Value of distribution system insulation</p>	<p>Insulation</p>
<p><b>Locate and differentiate between supply and return ducts. The location of air ducts and air handlers shall be recorded as in attic space, crawlspace, basement, or other conditioned or unconditioned space. Use the definitions in Section 3 to classify the locations as Infiltration Volume, Conditioned Space Volume, Unconditioned Space Volume, or Unrated Conditioned Space. Provide additional details</b> when supply/return ducts <b>and air handlers</b> are located in <b>more than one area.</b></p>	<p>Determine the location of ducts <b>and air handler</b></p>	<p>Location of air ducts <b>and air handler</b></p>

Leakage of air ducts	Determine air leakage from ducts	Follow Procedure for Measuring Airtightness of Duct Systems in ANSI 380. The air handler shall be installed prior to testing.
Circulation pumps	Determine the energy use of the distribution pumps	Record the horsepower and model number of any primary and secondary pumps associated with the distribution circulation loop, excluding any pumps on standby. Use the model number of the pumps to determine the pump motor efficiency from the manufacturer's data sheet. The number of Dwelling Units served by the circulation loop shall also be determined.

**Building Element: Heating and Cooling Energy Source**

<b>Rated Feature Task</b>		<b>On-Site Inspection Protocol</b>
Fuel type	Determine fuels used for heating and cooling	Heating systems use natural gas, propane, oil, electricity, or some other fuel. Most cooling systems are driven by electricity, however some cooling equipment uses natural gas or propane.

**Building Element: Heating and Cooling Equipment**

Rated Feature	Task	On-Site Inspection Protocol
Equipment Class	Identify Class of equipment for heating and/or cooling	<p><i>Individual</i> - standalone equipment serving a single Dwelling Unit, often located within the Dwelling Unit. These units heat and/or cool the space and, other than electric connections to power the fans, controls, or compressors, are not connected to circulating fluids from a central boiler or Chiller.</p> <p><i>Terminal</i> - individual equipment that heats and/or cool the space and are connected to boilers, Chillers, Variable Refrigerant Flow Multi-Split Air Conditioning and Heat Pump Equipment, and/or Cooling Towers. Fan coils and Water Loop Heat Pumps often indicate the use of a remote central boiler and/or Chiller. However, some terminal equipment appears similar to individual equipment and yet relies on a remote energy source to function. Look for insulated water pipes, refrigerant tubing, or control valves and confirm that there is no in-unit heating or cooling equipment or equipment in adjacent spaces that solely serves the terminal equipment of the Dwelling Unit that may be outside of the Dwelling Unit.</p> <p><i>Central</i> - larger heating or cooling equipment that serves more than one Dwelling Unit, and possibly common spaces, using a conveyance to deliver and receive a circulating energy transfer medium to heat and/or cool the Dwelling Units through their terminal equipment. The circulation conveyance may be water piping or refrigerant tubing and likely will be insulated. Water loops will have circulating pumps. See Central Equipment below for details.</p>
Location	Determine the location of	Record whether individual, terminal, and central systems are in Conditioned

	heating and cooling equipment	Space Volume, Unrated Conditioned Space, Unrated Heated Space, or Unconditioned Space Volume.
Control system	Identify the control system for the heating and cooling system(s)	Determine the type of control systems and look for separate controls for the heating and cooling systems.  Determine and record whether the Dwelling Unit thermostat controls are programmable, understanding that not all digital thermostats are programmable.
Efficiency	Determine the heating and cooling equipment efficiency and capacity	Look for the equipment nameplates and product literature. Record the manufacturer and model number, capacity, and, if listed directly on the nameplate, the efficiency rating. If not listed, use the model number to identify the efficiency rating in the AHRI directory. Where the nameplate information is not available or not accessible, use manufacturer's data sheet, equipment directories, or age-based defaults from Section 4.5.2 to determine and record an appropriate efficiency.  SEER is used to measure the cooling efficiency of central air conditioning and Air Source Heat Pump systems. EER is used to determine the cooling efficiency of room air conditioners, VRF, Water Loop Heat Pumps, and Ground Source Heat Pumps. EER can be calculated from the nameplate information by dividing Btu output by Watt input. Chillers are rated in kW/ton.  HSPF or COP is used to measure the heating efficiency of Air Source Heat Pumps, VRF, Water Loop Heat Pumps, and Ground Source Heat Pumps. AFUE or Thermal Efficiency is used to measure the efficiency of furnaces and boilers.
<u>Heating and cooling energy source-Fuel type</u>	Determine fuels used for heating and cooling	Heating systems use natural gas, propane, oil, electricity, or some other fuel. Most cooling systems are driven by electricity, however some cooling equipment uses natural gas or propane.
<u>Location</u>	Determine the location of heating and cooling equipment	<del>Record whether individual, terminal, and central systems are in-Conditioned Space-Volume, Unrated-Conditioned Space, Unrated Heated Space, or Unconditioned Space-Volume.</del>

<b>Building Element: Heating and Cooling Equipment (<del>Individual</del>)</b>	
<b>Rated Feature</b>	<b>On-Site Inspection Protocol</b>
<u>Equipment type</u> <u>Individual Heating and Cooling Equipment</u>	Determine the individual heating/cooling type that is present in each Dwelling Unit. Typical unit types are defined below:  <i>Boiler</i> – this device creates hot water or steam, powered by any fuel type, and

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can be used with forced air distribution, in conjunction with a fan coil unit or PTAC where the fan blows air over the hot water coil to provide heating, or distributed by forced hot water, steam, or a hot water radiant slab system.

*Direct evaporative cooler* - is used primarily in very dry climates. Evaporative coolers work by blowing air over a damp pad or by spraying a fine mist of water into the air. Direct evaporative coolers add moisture to the home.

*Furnace* - comprised of a combustion chamber and heat exchanger or an electric resistance element and a fan that forces air across the heat exchanger or resistance element to provide heat in a forced air system.

*Ground Source Heat Pumps* - are coupled to the ground through the use of a water well. In Attached Dwelling Units, confirm and record when a circulation loop is shared amongst multiple Dwelling Units. See Central Equipment below for details.

*Packaged terminal air conditioner (PTAC)* - a factory-selected wall sleeve and separate unencased combination of heating and cooling components, assemblies, or sections. It may include heating capability by hot water, steam, or electricity and is intended for mounting through the wall to serve a single room or zone. If a hot water coil is present, determine if the boiler is individual or central.

*Packaged terminal Heat Pump (PTHP)* - a PTAC capable of using the refrigerating system in a reverse cycle or Heat Pump mode to provide heat.

*Split system Air Source Heat Pump* - move energy from one location to another using the vapor compression cycle. They are electrically driven, and provide heating in winter and cooling in summer by reversing the direction of heat flow. Split system Heat Pumps consist of an outdoor unit and an indoor air handling unit, resembling a furnace. These systems require ductwork for air distribution. Most Air Source Heat Pumps incorporate electric resistance supplemental heat in the indoor section. However, some Heat Pump systems use a fossil fuel furnace for supplemental heating. These are known as "dual fuel" or add-on systems.

*Split system air conditioner* - similar to a split system Air Source Heat Pump. Consists of an outdoor unit and a coil in the forced air distribution system. These systems are electrically powered and provide cooling.

*Through-the-wall ductless Air Source Heat Pump* - a single packaged Air Source Heat Pump installed without a distribution system. Provides both heating and cooling and is installed through an exterior wall.

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*Unitary space heater* - these are fossil fuel burning heaters that have individual controls and no distribution system. Determine and record when the system is equipped with a fan for forcing air circulation over a heat exchanger or uses simple convective forces. These heaters are mounted on outside walls to facilitate venting and use natural gas, kerosene, propane, or other types of fossil fuel.

*Variable-speed Mini-Split and Multi-Split Heat Pumps* - these systems are listed under “residential” in the AHRI Directory and have multiple configurations, depending on whether the system is “single-port” or “multi-port” and whether it is ducted, non-ducted, or a mix. They are considered individual systems when they serve only one Dwelling Unit<sup>3</sup>.

*Window/through-the-wall air conditioner* – is a single packaged ductless air conditioner designed to be installed without a distribution system and without a factory-selected sleeve.

*Electric resistance heater* – these are electric heaters that typically have individual controls and no distribution system. They are typically either electric baseboard heaters, electric wall heaters, or electric bathroom heaters.

**Building Element: Heating and Cooling Equipment (Terminal)**

Rated Feature	Task	On-Site Inspection Protocol
<p><u>Equipment Type</u> <u>Terminal Heating and Cooling Equipment</u></p>	<p>Identify the type(s) of terminal equipment served by centralized systems for heating and/or cooling in each Dwelling Unit</p>	<p>Determine the terminal heating/cooling type that is present in each Dwelling Unit. Typical terminal unit types are defined below:</p> <p><i>Fan coil unit</i> – hot/chilled water from a central boiler/Chiller is circulated through a coil. A fan blows air over the coil to provide heating/cooling.</p> <p><i>Hot Water Packaged Terminal Air Conditioner (HW PTAC)</i> – a PTAC that includes a hot water coil connected to a central boiler.</p> <p><i>Hydronic/radiant or convectors</i> – hot water from a central boiler is pumped through a series of radiator elements to supply heat. Conventional radiator elements are radiators, baseboard “fin tube” radiators, cast iron baseboards, or radiant hot water panels located at the baseboards or on the walls or ceilings.</p> <p><i>Variable Refrigerant Flow Multi-Split Air Conditioning and Heat Pump terminal units</i> – refrigerant flows at a variable rate from one or more central outdoor condensing units to evaporator units located in the Dwelling Units.</p>

Styles of VRF terminal units include wall mounted, ceiling cassette, ceiling suspended, and are either ducted, non-ducted, or mixed.

*Water Loop Heat Pumps* – hot/cold water from a centralized boiler and Cooling Tower is circulated through a Heat Pump in each Dwelling Unit.

<b>Building Element: Heating and Cooling Equipment (Central)</b>	
<b>Rated Feature</b>	<b>Task</b>
<p><u>Equipment type</u> <u>Central Heating and Cooling Equipment</u></p>	<p>Identify <del>ing</del> type(s) of central equipment serving terminal units in each Dwelling Unit</p> <p><i>Boiler</i> – this device creates hot water or steam, may be powered by any fuel type, and can be used with forced air distribution, in conjunction with a fan coil unit or PTAC where the fan blows air over the hot water coil to provide heating, or distributed by forced hot water, steam, or a hot water radiant slab system. Record whether the boiler also provides service hot water.</p> <p><i>Chiller</i> – Vapor compression cooling equipment that uses the outdoor air or water circulated through a Cooling Tower as a heat sink for cooling and absorbs heat from conditioned space by means of a hydronic cold water distribution system. Determine whether the Chiller is a DX Chiller, water-cooled, or absorption.</p> <p><i>Cooling Tower</i> – A heat rejection device that rejects heat to the atmosphere. Record the fan horsepower from the nameplate data of the Cooling Tower fan located inside the Cooling Tower. Record the horsepower and model number of the sprayer pump located inside the Cooling Tower. Alternatively, record the model number from the nameplate data of the Cooling Tower to determine the fan and sprayer pump data from manufacturer’s data sheet.</p> <p><i>Ground Source Heat Pump</i> – shared vapor compression heating and cooling equipment that uses the ground or ground water as the heat source or sink for heat.</p> <p><i>Rooftop Make-Up Air Unit (MAU) or Dedicated Outdoor Air System (DOAS)</i> – large rooftop equipment that provides outdoor air or make-up air, with or without heating or cooling. In multifamily buildings, these systems may provide ducted air directly to the Dwelling Units or to other common spaces.</p> <p><i>Single packaged air conditioner</i> - similar to single packaged Air Source Heat Pumps, these systems provide cooling only. In multifamily buildings, these systems may</p>

	<p>provide ducted air directly to the Dwelling Units or to other common spaces.</p> <p><i>Single package Air Source Heat Pump</i> - a single package Heat Pump is similar to a split system, except it combines the functions of the indoor and outdoor units into one cabinet, mounted on the roof or on the ground. In multifamily buildings, these systems may provide ducted air directly to the Dwelling Units or to other common spaces.</p> <p><i>Variable Refrigerant Flow Multi-Split Air Conditioning and Heat Pump outdoor units</i> – refrigerant flows at a variable rate from one or more central outdoor condensing units to evaporator units located in the Dwelling Units.</p>
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<b>Building Element: Service Hot Water (SHW) System Equipment</b>	
<b>Rated Feature</b>	<b>On-Site Inspection Protocol</b>
Equipment class for Service Hot Water (SHW)	<p><i>Individual</i> - standalone service hot water system serving a single Dwelling Unit.</p> <p><i>Central</i> - shared service hot water system serving more than one Dwelling Unit. These shared systems may also provide service hot water to common spaces and shared laundry rooms.</p> <p><i>Laundry</i> - service hot water system providing hot water for shared clothes washers that does not provide other service hot water to the Dwelling Unit.</p>
<b>Location</b>	<p><b>Determine location of service hot water equipment</b></p>
<b>Efficiency</b>	<p>Determine the Energy Factor, Uniform Energy Factor, or thermal efficiency of the service hot water equipment</p> <p>Look for the water heater's nameplate and product literature. Record the manufacturer, model number, and if listed directly on the nameplate, the efficiency rating.</p> <p>Search for the model number in an appropriate efficiency rating directory to determine and record the EF, UEF, or thermal efficiency rating. When thermal efficiency is recorded, also record the standby loss if available.</p> <p>When the efficiency rating cannot be determined, approximate the age of the unit and use a default efficiency.</p>
Extra tank insulation value	<p>Determine the insulation value of any exterior wrap</p> <p>Visually determine whether the water heater is or is not wrapped with exterior insulation. When insulation is present, measure the thickness of the wrap and determine and record the R-Value.</p>
<b>Location</b>	<p><b>Determine location of service hot water equipment</b></p> <p><del>Determine whether the water heater is in Conditioned or Unconditioned Space Volume, Unrated Heated Space, or Unrated Conditioned Space.</del></p>
Individual service hot water equipment type	<p>Determine type, capacity, and fuel source of standalone water heater serving single Dwelling Unit</p> <p>Identify whether the equipment is storage or instantaneous, identify its fuel source, and record storage tank capacity in gallons. Also record whether the SHW equipment is supplemented by a desuperheater and/or if it is integrated with the space heating system.</p>
Central service hot	<p>Determine type, capacity.</p> <p>Identify if equipment is a boiler or water heater. residential or commercial</p>

water equipment type	fuel source, and pump power of shared service hot water equipment serving more than one Dwelling Unit	<p>grade, its fuel source, pump power, and record storage tank capacity in gallons. Also record whether the SHW equipment is integrated with the space heating system and how many Dwelling Units it serves.</p> <p><i>Central boiler with indirect fired storage tanks</i> – Record the number of boilers and tanks. Record the fuel source and the model number, capacity, and insulation value, when present, of the unfired storage tanks.</p> <p><i>Central service hot water heater</i> – Record the number of water heaters, the fuel source, capacity, and insulation value, when present.</p> <p><i>Central pump power</i> - in addition, record the horsepower and model number of all primary and secondary pumps that are associated with the service hot water distribution loop, excluding any pumps on standby. If not listed on the nameplate, use the pump model number to determine the pump motor efficiency from the manufacturer’s data sheet.</p>
Laundry service hot water equipment type	Determine type, capacity, and fuel source of laundry SHW equipment	Where a separate service hot water system provides hot water to clothes washers; but does not provide other service hot water to the Dwelling Unit, follow guidance for individual service hot water systems above to identify system type, capacity, and fuel source.
Drain Water Heat Recovery (DWHR)	Determine efficiency and performance factors	<p>Where DWHR units are installed and serve the Rated Home, record the model number of the DWHR unit, its efficiency, and the number of showers in the Rated Home that are connected to the unit.</p> <p>A performance factor shall be determined based on its installation location. Determine if the DWHR unit supplies pre-heated water to the cold water piping, hot water heater potable supply piping, or to both.</p>

<b>Building Element: Service Hot Water Distribution</b>	
<b>Rated Feature</b>	<b>On-Site Inspection Protocol</b>
Hot water pipe length	<p>The hot water distribution pipe length from the water heater to the farthest hot water fixture shall be measured horizontally and vertically along its length, assuming the hot water piping does not run diagonally.</p> <p>For Dwelling Units being served by a Central SHW with a recirculation loop, begin the pipe length measurement from the shared recirculation loop rather than the water heater.</p> <p>The measured pipe length shall be inspected during construction and re-calculated if it did not conform to the designed plan layout.</p>
Pipe insulation	Inspect the hot water piping for the presence of insulation and record the



<p>percentage of piping that is insulated. Measure the thickness of the insulation and identify material to determine its R-Value.</p>	<p>percentage of piping that is insulated. Measure the thickness of the insulation and identify material to determine its R-Value.</p>
<p>insulation</p>	<p>Determine the hot water recirculation type, control strategy, and branch length</p>
<p>Recirculation system</p>	<p>Inspect the hot water distribution system to determine whether the system is a standard system or a recirculation system. A standard system shall be used for Attached Dwelling Units unless the recirculation system is entirely within the Rated Home.</p> <p>When a recirculation system is entirely within the Rated Home, then the control strategy shall be documented as one of the following strategies.</p> <p><u>Uncontrolled – the pump runs continuously.</u></p> <p><del>Timer or Uncontrolled</del> – the <del>recirculation</del> pump is controlled by a timer <del>or runs continuously</del></p> <p><i>Temperature control</i> – the pump runs based on monitoring temperature at some point in the system</p> <p><i>Demand (presence sensor)</i> – the pump only runs when a sensor detects someone is present at the faucet</p> <p><del>Demand (Manual)</del> – the pump only runs when a user presses a button indicating they are about to use hot water:-</p> <p>The branch hot water pipe length from the recirculation loop to the farthest hot water fixture from the recirculation loop shall be measured longitudinally, assuming the branch hot water piping does not run diagonally.</p> <p>Record the rated gpm printed on all showerheads and faucets. When the gpm rate is not visible, collect documentation showing the model number of the plumbing fixtures and use manufacturer’s data sheet to determine and record the rated gpm.</p> <p><del>The hot water distribution pipe length from the water heater to the farthest hot water fixture shall be measured horizontally and vertically along its length, assuming the hot water piping does not run diagonally.</del></p> <p><del>For Dwelling Units being served by a Central SHW with a recirculation loop, begin the pipe length measurement from the shared recirculation loop rather than the water heater.</del></p> <p><del>The measured pipe length shall be inspected during construction and re-evaluated if it did not conform to the designed plan layout.</del></p> <p><del>Inspect the hot water piping for the presence of insulation and record the percentage of piping that is insulated. Measure the thickness of the insulation</del></p>
<p>Flow rates of faucets and showerheads</p>	<p>Determine gpm of faucets and showerheads</p>
<p>Hot water pipe length</p>	<p>Determine hot water distribution pipe length</p>
<p>Pipe insulation</p>	<p>Determine R-Value of pipe insulation</p>

Building element: Solar Domestic Hot Water System <u>Equipment</u>	
Rated Feature	On-Site Inspection Protocol
System type	<p>Determine whether a solar domestic hot water system exists. These systems collect and store solar thermal energy for domestic water heating applications. When a solar water heating system exists, determine system type. For systems manufactured after January 1, 1995, system type, Energy Factor (EF), and other performance characteristics shall be determined from the SRCC label and by referring to SRCC literature. For systems lacking an SRCC label, Energy Factor and other performance characteristics are determined using a certified energy modeling tool or appropriate default values. Identify as passive or active. Base your evaluation on these criteria:</p> <p><i>Passive</i> - No purchased electrical energy is required for recirculating water through a passive solar collector. Three types of passive systems are integrated collector storage (ICS), thermosiphon systems and self-pumped systems.</p> <p><i>Integrated Collector Storage (ICS)</i> - consists of a single unit that incorporates both collector and water storage<sup>4</sup>.</p> <p><i>Thermosiphon</i> - consists of a flat-plate solar collector and hot water storage tank. Instead of using a pump, circulation of the fluid is achieved by natural convection action. The storage tank must be located above the collector<sup>5</sup>; and can be inside or outside the Conditioned Space Volume.</p> <p><i>Self-pumped</i> - circulates fluid from storage to collectors without purchased electrical energy. Photovoltaic and percolating systems are self-pumped systems. The storage tank can be inside or outside the Conditioned Space Volume.</p> <p><i>Active</i> - Also known as pumped systems.</p> <p><i>Pumped</i> - purchased electrical energy input is required for operation of pumps or other components. The storage tank can be inside or outside the Conditioned Space Volume.</p>
Solar collector type	Identify the type of solar collector by checking for the SRCC label or manufacturer's data sheet.
Collector details	<p>Determine the area of the collector.</p> <p>Determine the orientation of the solar collector to the nearest cardinal/ordinal point in the direction toward which the collector faces.</p> <p>To determine the tilt of the collector use either geometric calculations based on horizontal length and vertical height measurements or a site calculation and angle</p>

		horizontal length and vertical height measurements of a site selection and angle finder instrument.
Efficiency	Determine efficiency of solar system	Search for SRCC label. Check for SRCC system and component nameplates. Refer to the Directory of SRCC Certified Solar Collector and Water Heating System Ratings, or other SRCC literature for Energy Factor (EF) and other performance data.
Storage tank size and location	Determine the capacity of the storage tank and location	To determine the size of the storage tank, refer to documentation or a label indicating the tank capacity.  Determine and record whether the storage tank is in Conditioned or Unconditioned Space Volume, Unrated Heated Space, or Unrated Conditioned Space.
Extra tank insulation value	Determine the insulation value of any exterior wrap	See Service Hot Water, above.
Pipe insulation value	Determine the insulation value of the pipes	Determine the R-Value of insulation installed on pipes.

<b>Building Element: Light Fixtures</b>		
<b>Rated Feature</b>	<b>Task</b>	<b>On-Site Inspection Protocol</b>
Number of Qualifying and non-qualifying Light Fixtures	Calculate percentage of Qualifying Light Fixtures by dividing the part by the whole	<u>For each of the three categories of lighting locations (ie. Interior, Exterior, and Garage), Record</u> whether the Qualifying Light Fixtures are or are not installed at the time of the inspection.  If the Qualifying Light Fixtures are installed at the time inspection, then determine if they are Tier I or Tier II.  <u>For each of the three categories of lighting locations (i.e. Interior, Exterior, and Garage), Record</u> the ratio of Qualifying Tier I Light Fixtures to all light fixtures in Qualifying Light Fixture Locations and the ratio of Qualifying Tier III Light Fixtures to all light fixtures in Qualifying Light Fixture Locations. This ratio is calculated by fixture and not by light bulb.

<b>Building Element: Refrigerator(s)</b>		
<b>Rated Feature</b>	<b>Task</b>	<b>On-Site Inspection Protocol</b>
Total annual consumption of refrigerator	Determine total annual consumption of refrigerator	Record whether the refrigerator is or is not installed at the time of the inspection.  If the refrigerator is installed at the time of inspection, then record the model number of the refrigerator and determine the total annual consumption from

either the refrigerator Energy Guide Label, the California Energy Commission Appliance Database, the age-based defaults from Table 4.2.2.5.2.5(1) of ANSI 301, the EPA ENERGY STAR website, or another reputable source.

Record the location of the refrigerator, whether it is in the Conditioned Space Volume of the Dwelling Unit, Unrated Heated Space, or Unrated Conditioned Space.

If there are refrigerators and/or freezers and/or wine coolers in multiple locations within the Dwelling Unit or building, then use the location that represents the majority of power consumption. Total consumption for refrigerators is additive. It shall include all the power consumed by all the refrigerators and/or freezers for use by the occupants of the Dwelling Unit.

<b>Building Element: Dishwasher(s)</b>	
<b>Rated Feature</b>	<b>On-Site Inspection Protocol</b>
Total annual consumption of dishwasher	Record whether the dishwasher is or is not installed at the time of the inspection.
Determine the Energy Factor or total annual consumption of dishwasher	When the dishwasher is installed at the time of inspection, record the model number of the dishwasher and determine the total annual consumption or Energy Factor from either the dishwasher Energy Guide Label, the California Energy Commission Appliance Database, the EPA ENERGY STAR website, or another reputable source.
	In addition, determine and record the place setting capacity. Record the location of the dishwasher, whether it is in the Conditioned Space Volume of the Dwelling Unit, Unrated Heated Space, or Unrated Conditioned Space.
	<u>If there are dishwashers in multiple locations within the Dwelling Unit or building, then use the location that represents the majority of power consumption.</u>

<b>Building Element: Range/Oven</b>	
<b>Rated Feature</b>	<b>On-Site Inspection Protocol</b>
Total annual consumption of range/oven	Record whether the range/oven is or is not installed at the time of the inspection.
Determine the total annual consumption of range/oven	

		<p>When the range/oven is installed at the time inspection,</p> <ul style="list-style-type: none"> <li>○ Determine and record the fuel source for cooking. If different fuels are used, select the fuel for the range.</li> <li>○ Determine and record if the range is an induction range <ul style="list-style-type: none"> <li>▪ Use model number to search for manufacturer's data sheet or other reputable source</li> </ul> </li> <li>○ Determine and record whether the oven is a convection oven or not <ul style="list-style-type: none"> <li>▪ Use model number to search for manufacturer's data sheet or other reputable source</li> </ul> </li> </ul>
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<b>Building Element: Clothes Washer</b>		
<b>Rated Feature</b>	<b>Task</b>	<b>On-Site Inspection Protocol</b>
Total annual consumption of clothes washer	Determining the total annual consumption of clothes washer	<p>Record whether the clothes washer is or is not installed at the time of the inspection.</p> <p>When the clothes washer is installed at the time inspection,</p> <ul style="list-style-type: none"> <li>○ Record clothes washer model number.</li> <li>○ Record the location of the clothes washer, whether it is in the Conditioned Space Volume of the Dwelling Unit, Unrated Heated Space, or Unrated Conditioned Space.</li> <li>○ Determine the capacity in cubic feet and Modified Energy Factor (MEF) or the Integrated Modified Energy factor (IMEF) of the clothes washer from <ul style="list-style-type: none"> <li>▪ the manufacturer's data sheet,</li> <li>▪ the California Energy Commission Appliance Database,</li> <li>▪ the EPA ENERGY STAR website, or another reputable source.</li> </ul> </li> </ul> <p>When the clothes washers are located outside of the Dwelling Unit, in addition to the information above, record the number of clothes washers. To model performance credit for common area clothes washers, a minimum of one clothes washer per eight Dwelling Units is required.</p> <p>If a water heater separate from the one serving the Rated Home provides hot water to the clothes washer, record the nameplate data of the service hot water heating system that provides hot water to the clothes washers. See Service Hot Water heating section for the information required.</p>

<b>Building Element: Clothes Dryer</b>		
<b>Rated Feature</b>	<b>Task</b>	<b>On-Site Inspection Protocol</b>

Total annual consumption of clothes dryer	Determining the total annual consumption of clothes dryer	<p>Record whether the clothes dryer is or is not installed at the time of the inspection.</p> <p>When the clothes dryer is installed at the time inspection,</p> <ul style="list-style-type: none"> <li>○ Record clothes dryer model number.</li> <li>○ Determine the fuel type of the dryer.</li> <li>○ Determine whether the clothes dryer is moisture sensing or not.</li> <li>○ Record the location of the clothes dryer, whether it is in the Conditioned Space Volume of the Dwelling Unit, Unrated Heated Space, or Unrated Conditioned Space.</li> <li>○ Determine the Efficiency Factor or Combined Energy Factor of the clothes dryer from: <ul style="list-style-type: none"> <li>▪ the manufacturer's data sheet,</li> <li>▪ the California Energy Commission Appliance Database,</li> <li>▪ the EPA ENERGY STAR website, or another reputable source.</li> </ul> </li> </ul> <p>When the clothes dryers are located outside of the Dwelling Unit, in addition to the information above, record the number of clothes dryers.</p>
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<b>Building Element: Ceiling Fans</b>	
<b>Rated Feature</b>	<b>On-Site Inspection Protocol</b>
Total annual consumption of ceiling fan	<p>Determining the total annual consumption of ceiling fan</p> <p>Record whether ceiling fans are or are not installed at the time of the inspection.</p> <p>When ceiling fans are installed at the time of the inspection,</p> <ul style="list-style-type: none"> <li>○ Record the number of ceiling fans in the Dwelling Unit. For ceiling fans to be modeled, there must be one fan per Bedroom plus one more elsewhere in the Dwelling Unit.</li> <li>○ Record the model number for all ceiling fans.</li> <li>○ Record the average efficiency for the fans installed (cfm/W) at medium speed.</li> </ul>

<b>Building Element: Dwelling Unit Mechanical Ventilation System(s)</b>	
<b>Rated Feature</b>	<b>On-Site Inspection Protocol</b>
Centralized system equipment type	<p>Data collection for centralized Dwelling Unit Mechanical Ventilation</p> <p><i>Centralized exhaust fans</i> – Record the model number from the nameplate data of each fan being utilized to provide Dwelling Unit Mechanical Ventilation. Use the fan model number to determine the fan <a href="#">CFMeFin</a> and wattage or</p>

<p>systems that serve more than one Dwelling Unit</p>	<p>horsepower from the manufacturer's data sheet.</p> <p><i>Centralized supply or balanced system fans</i> – Record the model number from the nameplate data of each fan being utilized to provide ventilation air, directly or indirectly, to the Dwelling Unit. Record the percent of outdoor air in the supply air and whether the supply air is heated or cooled. If conditioned, record capacity and efficiency ratings of heating and cooling systems. Use the fan model number to determine the fan <del>CFM</del><b>cfm</b> and wattage or horsepower from the manufacturer's data sheet. For balanced systems, also record the sensible recovery efficiency and total recovery efficiency.</p>
<p>Individual system equipment type</p>	<p><i>Individual exhaust fans</i> – Record the fan wattage and model number from the nameplate data of the exhaust fan being utilized to provide Dwelling Unit Mechanical Ventilation. Use the fan model number to determine the fan wattage from the manufacturer's data sheet or HVI Directory. Where the fan is equipped with a timer, document the run time for the fan. If the fan is set to run continuously, then document the run time as 24 hours. In Attached Dwelling Units, it shall be determined whether there is supply air provided to the Dwelling Unit, directly or indirectly from adjacent corridor. See Corridor Ventilation section for guidance.</p> <p><i>Individual supply fans</i> – Record the fan wattage and model number from the nameplate data of the supply fan being utilized to provide Dwelling Unit Mechanical Ventilation. Use the fan model number to determine the fan wattage from the manufacturer's data sheet or HVI Directory. If the fan is equipped with a timer, document the run time for the fan. If the fan is set to run continuously then document the run time as 24 hours. Record whether the supply fan is separate or integrated with the space conditioning system.</p> <p><i>Individual Balanced Ventilation Fans</i> – These are commonly known as energy recovery ventilators (ERV) or heat recovery ventilators (HRV). Record model number from the nameplate data of the ERV/HRV. Use the model number to determine the fan wattage, sensible recovery efficiency, and total recovery efficiency from the manufacturer's data sheet or HVI Directory. If the fan is equipped with a timer, document the run time for the fan. If the fan is set to run continuously, then document the run time as 24 hours.</p> <p><i>Central Fan Integrated Supply (CFIS) Ventilation System</i> – A central fan integrated Supply Ventilation System is a specific type of supply-only ventilation that includes a duct running from the outside into the return plenum of the heating/cooling system, a mechanical damper, and controls that ensure the system provides ventilation air even when there is no demand for heating or cooling. For these systems, record the central fan <del>wattage</del><b>and</b> model number from the nameplate data of the air handler fan and whether or not it is equipped with an ECM motor. Use the fan model number to determine the fan <b>cfm</b> and</p>

	<p><u>either horsepower or wattage</u> from the manufacturer's data sheet. <u>Where fan wattage is not provided, use (HP x 746)/0.90 to calculate fan wattage. Where the fan has multiple speeds, use values associated with the high-speed setting to select or calculate the fan wattage.</u></p> <p><i>Unit ventilator</i> – Similar to the CFIS system, a fan coil unit can be designed to provide both space conditioning and mechanical ventilation to the space that it is serving. Classify as a ventilation system only if the unit operates continuously with the outside air damper open or if the damper is controlled to allow the supply of ventilation air when there is no call for heating or cooling.</p>
Dwelling Unit Mechanical Ventilation rate	Measure exhaust and supply airflow
	Ventilation airflows in the Dwelling Unit shall be measured following the procedures in ANSI 380.

<b>Building Element: Corridor Ventilation</b>	
<b>Rated Feature</b>	<b>Task</b>
Supply Ventilation	Determining whether a corridor ventilation system is being-used to directly or indirectly supply the adjacent Dwelling Units with ventilation air
	<p><b>On-Site Inspection Protocol</b></p> <p>Document whether or not weatherstripping and a door sweep are installed on the Dwelling Unit entry door.</p> <p>Document whether or not there is a Supply Ventilation System serving the adjacent common corridor.</p> <p>If there is a Supply Ventilation System serving the adjacent common corridor, then record the model number from the nameplate of that system. Use the model number to determine if the ventilation air is being heated or cooled, the percent of outdoor air supplied, the fan power, and heating/cooling efficiencies.</p>

<b>Building Element: On-Site Power Production</b>	
<b>Rated Feature</b>	<b>Task</b>
Annual electricity generation for On-Site Power Production (OPP) systems	Data collection for On-Site Power Production systems
	<p><b>On-Site Inspection Protocol</b></p> <p><i>On-Site Power Production systems</i> – Collect documentation that shows the annual kWh/y generated. For combined heat and power systems, the documentation shall include the annual gas use in addition to kWh/y generated.</p> <p><i>Photovoltaic Systems</i> – in situations where the Approved Software Rating Tool calculates electricity generation from photovoltaic systems, determine the following:</p> <ul style="list-style-type: none"> <li>- the orientation of the photovoltaic array to the nearest cardinal/ordinal point, in the direction the array faces.</li> <li>- the tilt of the array. Use an angle finder instrument or geometric calculation.</li> </ul>



- the area of the array and the peak power using the information on the SRCC label or manufacturer's data sheet.
- the efficiency of the inverter using the manufacturer's data sheet.