DRAFT Rater Design Checklist[1]
ENERGY STAR Multifamily New Construction Version 1.0 / 1.1

Note: This is a draft of a work in progress for the purposes of stakeholder feedback. There may be errors with formatting, numbering, etc.

Building Address: _____ City: _____ State: _____ Permit Date: _____

1. Partnership Status	Must Correct	Rater [3] Verified
1.1 Rater has verified that builder or developer is an ENERGY STAR partner using energystar.gov/partnerlocator	☐	☐
1.2 Rater has verified that "FT Agent" holds credential required to complete the HVAC Functional Testing Checklist[4] "FT Agent" Company Name(s): _____	☐	☐
2. High-Performance Fenestration		
2.1 Dwelling units:		
2.1.1 Prescriptive: Specified fenestration meets or exceeds ENERGY STAR MF Reference Design requirements[5]	☐	☐
2.1.2 HERS and ASHRAE only: Specified fenestration meets or exceeds 2009 IECC residential requirements[5]	☐	☐
2.2 Common space:		
2.2.1 HERS and Prescriptive: Specified fenestration meets or exceeds ENERGY STAR MF Reference Design requirements[5]	☐	☐
2.2.2 ASHRAE only: Specified fenestration meets or exceeds 2009 IECC commercial requirements[5]	☐	☐
3. High-Performance Insulation		
3.1 Dwelling unit:		
3.1.1: Prescriptive: Specified ceiling[6], wall[7], floor, and slab-on-grade insulation levels meet or exceed ENERGY STAR MF Reference Design requirements for "Group R"[8, 9, 10]	☐	☐
3.1.2: HERS and ASHRAE only: Specified ceiling[6], wall[7], floor, and slab-on-grade insulation levels meet or exceed values from the "Group R" column in the 2009 IECC Commercial chapter[8, 9, 10]	☐	☐
3.2 Common space:		
3.2.1 HERS and Prescriptive: Specified ceiling[6], wall[7], floor, and slab-on-grade insulation levels meet or exceed ENERGY STAR MF Reference Design requirements for 'All other'[8, 9, 10]	☐	☐
3.2.2 ASHRAE only: Specified ceiling[6], wall[7], floor, and slab-on-grade insulation levels meet or exceed the values from the 2009 IECC Commercial chapter'[8, 9, 10]	☐	☐
4. Review of HVAC Design Report [11]		
4.1 HVAC Design Report collected for records, with no Items left blank	☐	☐
4.2 HVAC Design Report reviewed by Rater for the following parameters (HVAC Design Report Item # indicated in parenthesis):		
4.2.1 Prescriptive Path: Dwelling Unit Mechanical Ventilation (2.6) is <150% of ASHRAE 62.2-2013 requirements[12]	☐	☐
4.2.2 HERS and Prescriptive Path: Common space Ventilation is <150% of ASHRAE 62.1-2013 (2.2)	☐	☐
4.2.3 HVAC design includes access and means (2.3) to measure the dwelling-unit mechanical ventilation airflow rate	☐	☐
4.2.4 Cooling season and heating season outdoor design temperatures used in loads (3.4) are within the limits defined at energystar.gov/hvacdesigntemps for the State and County where the building will be built, or the designer has provided an allowance from EPA to use alternative values [13]	☐	☐
4.2.5 Number of occupants used in loads (3.5) is within ± 2 of the dwelling unit to be certified and occupant gains (3.6) do not exceed 645 Btuh per occupant [14]	☐	☐
4.2.6 Conditioned floor area used in loads (3.7) is between zero and 300 sq. ft. larger than the dwelling unit to be certified	☐	☐
4.2.7 Window area used in loads (3.8) is between zero and 60 sq. ft. larger than the dwelling unit to be certified	☐	☐
4.2.8 Predominant window SHGC used in loads (3.9) is within 0.1 of predominant value in the dwelling unit to be certified [15]	☐	☐
4.2.9 Mechanical ventilation used in loads (3.11) is the same as the ventilation design (2.6) for the given unit plan	☐	☐
4.2.10 Non-occupant internal gains (3.12) are less than 3,600 Btuh	☐	☐
4.2.11 Sensible & total heat gain are documented (3.13, 3.15) for the orientation of the dwelling unit to be certified [16]	☐	☐
4.2.12 Cooling sizing % (4.16) is within the cooling sizing limit (4.17) selected by the HVAC designer	☐	☐
5. Construction Document Review – Recommended, not required		
5.1 Exterior Air Sealing: Review construction documents to verify that air-sealing details are represented which, at a minimum, demonstrate compliance with field checklist items in Section 4 of the Rater Field Checklist.		
5.1.1 Ducts, flues, shafts, plumbing, piping, wiring, exhaust fans, & other penetrations to unconditioned space sealed, with blocking / flashing as needed		☐
5.1.2 Recessed lighting fixtures adjacent to unconditioned space ICAT labeled and gasketed. Also, if in insulated ceiling without attic above, exterior surface of fixture insulated to ≥ R-10 in CZ 4-8		☐

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5.1.3 Above-grade sill plates adjacent to conditioned space sealed to foundation or sub-floor. Gasket also placed beneath above-grade sill plate if resting atop concrete / masonry & adjacent to cond. Space [17]	☐
5.1.4 Continuous top plate or blocking is at top of walls adjoining unconditioned space, and sealed	☐
5.1.5 Drywall sealed to top plate at all unconditioned attic / wall interfaces using caulk, foam, drywall adhesive (but not other construction adhesives), or equivalent material. Either apply sealant directly between drywall and top plate or to the seam between the two from the attic above	☐
5.1.6 Rough opening around windows & exterior doors sealed[19]	☐
5.1.7 Assemblies that separate attached garages from occupiable space sealed and, also, an air barrier installed, sealed, and aligned with these assemblies	☐
5.1.8 The gap between the common wall (e.g. the drywall shaft wall) and the structural framing between units sealed at all exterior boundaries	☐
5.1.9 Doors adjacent to unconditioned space (e.g., attics, garages, basements), ambient conditions, or a unit entrance to a corridor, made substantially air-tight with doorsweep and weatherstripping or equivalent gasket	☐
5.1.10 Attic access panels, drop-down stairs, & whole-house fans equipped with durable ≥ R-10 cover that is gasketed (i.e., not caulked). Fan covers either installed on unit side or mechanically operated. [20]	☐
5.2 Compartmentalization	
5.2.1 Review construction documents to verify that air-sealing details[21] are represented such that air exchange between the dwelling unit and outside as well as the dwelling unit and other adjacent spaces is minimized and will result in compartmentalization less than or equal to 0.30 CFM50 per square feet of dwelling unit enclosure area, following procedures in ANSI 380.	☐
5.2.2 Seal all spaces 5.1.1-5.1.10 on adiabatic unit enclosure assemblies	☐
5.3 Verify that thermal bridging details are in compliance with checklist items in Section 2 of the Rater Field Checklist	☐
5.4 Verify that air barrier details are in compliance with field checklist items in Section 3 of the Rater Field Checklist	☐
5.5 Verify that HVAC details are in compliance with checklist items in Sections 5 - 10 of the Rater Field Checklist	☐
5.6 Verify that DHW, Lighting, Appliances, Ceiling Fans, Plumbing Fixtures, and Whole Building Utility Data Acquisition details are in compliance with checklist items in Sections 11 – 14 of the Rater Field Checklist	☐

Rater Name: _____ Date of Review: _____

Rater Signature: _____ Rater Company Name:_____

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Building Address: _____ City: _____ State: _____ Permit Date: _____

Thermal Enclosure System	Must Correct	Builder Verified [3]	Rater Verified [4]	N/A [5]
1. High-Performance Fenestration & Insulation				
1.1 Fenestration meets or exceeds levels specified in Items 2.1 and 2.2 of the Rater Design Review	☐	☐	☐	-
1.2 Insulation meets or exceeds levels specified in Items 3.1 and 3.2 of the Rater Design Review Checklist	☐	☐	☐	-
1.3 All insulation achieves RESNET-defined Grade I installation. See Footnote 6 for alternatives [6]	☐	☐	☐	-
1.4 Prescriptive Path: Window-to-wall ratio ≤ 30%[7]	☐	☐	☐	☐
1.5 Heated plenums in unconditioned space or ambient conditions must meet the following requirements[8]				
1.5.1 Plenum walls are an air barrier and insulated to ≥ R-5ci in CZ 5-6; ≥ R-7.5ci in CZ 7; ≥ R-9.5ci in CZ 8, **AND;**	☐	☐	☐	☐
1.5.2 Plenum ceiling insulation meets or exceeds the R-value for mass floors from the "All other" column of Table 502.2(1) of 2009 IECC, **AND;**	☐	☐	☐	☐
1.5.3 Plenum floors must have at least R-13 insulation[9]	☐	☐	☐	☐
1.6: Garages with space heating must meet the following requirements[8]				
1.6.1 Insulation on above grade walls and walls on the first story below grade ≥ R-5ci in CZ 5-6; ≥ R-7.5ci in CZ 7; ≥ R-9.5ci in CZ 8, **AND;**	☐	☐	☐	☐
1.6.2 Garage ceiling insulation meets or exceeds the R-value for mass floors from the "All other" column of Table 502.2(1) of 2009 IECC.	☐	☐	☐	☐
2. Reduced Thermal Bridging				
2.1 For insulated ceilings with attic space above (i.e., non-cathedralized), Grade I insulation extends to the inside face of the exterior wall below and is ≥ R-21 in CZ 1-5; ≥ R-30 in CZ 6-8 [10]	☐	☐	☐	☐
2.2 For slabs on grade in CZ 4-8, 100% of slab edge insulated to ≥ R-5 at the depth specified by Table 502.2(1) of the 2009 IECC and aligned with the thermal boundary of the walls [11, 12]	☐	☐	☐	☐
2.3 For elevated concrete slabs in CZ 4-8 (i.e., podiums and projected balconies, but not intermediate slab floor edges) 100% of the slab edge insulated to ≥ R-5. For podiums, insulation must be installed for the full height of the podium wall. See Footnote 13 for balcony alternative [13]	☐	☐	☐	☐
2.4. For elevated concrete slabs in CZ 4-8 (i.e. podiums), floor insulation meets the U-factor specified in Table 502.1.2 of the 2009 IECC for Group R when dwelling units are above the slab, and for 'All Other' when common space is above the slab [14]	☐	☐	☐	☐
2.5 Insulation beneath attic platforms (e.g., HVAC platforms, walkways) ≥ R-21 in CZ 1-5; ≥ R-30 in CZ 6-8	☐	☐	☐	☐
2.6 At above-grade walls separating conditioned from unconditioned space, one of the following options used: [15]				
2.6.1 Continuous exterior rigid insulation, insulated siding, or combination of the two is: ≥ R-3 in CZ 1-4; ≥ R-5 in CZ 5-8 [16, 17, 18], **OR**;	☐	☐	☐	☐
2.6.2 Structural Insulated Panels **OR**; Insulated Concrete Forms **OR**; Double-wall framing **OR**; [16,19]	☐	☐	☐	☐
2.6.3 Option for CZ 1-3 OR buildings ≤3 stories: 'advanced framing' details including all of the Items below: [20]				
2.6.3a Corners insulated ≥ R-6 to edge [21], **AND**;	☐	☐	☐	☐
2.6.3b Headers above windows & doors insulated ≥ R-3 for 2x4 framing or equivalent cavity width, and ≥ R-5 for all other assemblies (e.g., with 2x6 framing) [22], **AND**;	☐	☐	☐	☐
2.6.3c Interior / exterior wall intersections insulated to same R-value as rest of exterior wall. [23]	☐	☐	☐	☐
3. Fully-Aligned Air Barriers [24] At each insulated location below, a complete air barrier is provided that is fully aligned as follows:				
Ceilings: At interior or exterior horizontal surface of ceiling insulation in Climate Zones 1-3; at interior horizontal surface of ceiling insulation in Climate Zones 4-8. Also, at exterior vertical surface of ceiling insulation in all climate zones (e.g., using a wind baffle that extends to the full height of the insulation in every bay or a tabbed baffle in each bay with a soffit vent that prevents wind washing in adjacent bays).[25]				
3.1 Dropped ceilings / soffits below unconditioned attics, chase / dead space, and all other ceilings	☐	☐	☐	☐
3.2 Top-plate blocking at parapet walls and other walls extending to unconditioned space	☐	☐	☐	☐
Walls: At exterior vertical surface of wall insulation in all climate zones; also at interior vertical surface of wall insulation in Climate Zones 4-8 [26]				
3.3 Walls behind showers, tubs, staircases, and fireplaces	☐	☐	☐	☐
3.4 Architectural bump-outs, dead space, and all other exterior walls	☐	☐	☐	-
Floors: At exterior vertical surface of floor insulation in all climate zones and, if over unconditioned space, also at interior horizontal surface including supports to ensure alignment. See Footnotes 28 & 29 for alternatives. [27, 28, 29]				
3.5 Floors above garages, floors above unconditioned basements or crawlspaces, and cantilevered floors	☐	☐	☐	☐
3.6 All other floors adjoining unconditioned space (e.g., rim / band joists at exterior wall or at porch roof)	☐	☐	☐	☐
4. Air Sealing (Unless otherwise noted below, "sealed" indicates the use of caulk, foam, or equivalent material)				
4.1 Ducts, flues, shafts, plumbing, piping, wiring, exhaust fans, & other penetrations to unconditioned space sealed, with blocking / flashing as needed	☐	☐	☐	-
4.2 Recessed lighting fixtures adjacent to unconditioned space ICAT labeled and gasketed. Also, if in insulated ceiling without attic above, exterior surface of fixture insulated to ≥ R-10 in CZ 4-8.	☐	☐	☐	☐

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4.3 Drywall sealed to top plate at all unconditioned attic / wall interfaces using caulk, foam, drywall adhesive (but not other construction adhesives), or equivalent material. Either apply sealant directly between drywall and top plate or to the seam between the two from the attic above.	☐	☐	☐	☐
4.4 Rough opening around windows & exterior doors sealed [31]	☐	☐	☐	-
4.5 Assemblies that separate attached garages from occupiable space sealed and, also, an air barrier installed, sealed, and aligned with these assemblies	☐	☐	☐	☐
4.6 Doors adjacent to unconditioned space, (e.g., attics, garages, basements) ambient conditions, or a unit entrance to a corridor made substantially air-tight with doorsweep and weatherstripping or equivalent gasket	☐	☐	☐	☐
4.7 Rater-measured compartmentalization is no greater than 0.30 CFM50 per square feet of dwelling unit enclosure area, following procedures in ANSI 380	☐	☐	☐	☐
HVAC System [32] (HVAC Design Report Item # indicated in parenthesis)		**Must Correct**	**Rater Verified [4]**	**N/A [5]**
5. Heating & Cooling Equipment				
5.1 HVAC manufacturer & model number on installed equipment matches either of the following (check box): [33] ☐ HVAC Design Report ☐ Written approval received from designer		☐	☐	-
5.2 Prescriptive Path: Heating and cooling equipment serving dwelling units meet the efficiency levels specified in the Exhibit X. Electric resistance heating is not specified in dwelling units		☐	☐	☐
5.3 HERS and Prescriptive Path: Heating and cooling equipment serving common spaces but not serving dwelling units meet the efficiency levels specified in the Exhibit X. See Exhibit X for restrictions on electric resistance		☐	☐	☐
5.4 External static pressure measured by Rater at contractor-provided test locations and documented below: [34] Return-Side External Static Pressure: _____IWC Supply-Side External Static Pressure:		☐	☐	☐
5.5: HVAC Functional Testing Checklist collected, with no items left blank. This is permitted, <u>but not required for credentialed HVAC Contractors completing the Functional Testing Checklist.</u>		☐	☐	☐
Equipment Controls	**Must Correct**	**LP Verified[35]**	**Rater Verified [4]**	**N/A [5]**
5.6 All heating and cooling systems serving a dwelling unit have thermostatic controls within the dwelling unit which are not located on exterior walls	☐	-	☐	☐
5.6.1 Prescriptive Path: Dwelling unit thermostats are programmable	☐	-	☐	☐
5.7 Stair and elevator shaft vents equipped with motorized dampers that are capable of being automatically closed during normal building operation and are interlocked to open as required by fire and smoke	☐	☐	☐	☐
5.8 Freeze protection systems, such as heat tracing of piping and heat exchangers, including self-regulating heat tracing, and garage/plenum heaters include automatic controls capable of shutting off	☐	☐	☐	☐
5.8.1 Where heat tracing is specified, a minimum of R-3 pipe insulation is also required	☐	☐	☐	☐
5.9 Snow- and ice-melting systems include automatic controls capable of shutting off the systems when the pavement temperature is above 50°F and no precipitation is falling, and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F so that the potential for snow or ice accumulation is negligible	☐	☐	☐	☐
Hydronic Distribution				
5.10 For hydronic distribution systems, all terminal heating and cooling distribution equipment are separated from the riser or distribution loop by a control valve or terminal distribution pump, so that heated or cooled fluid is not delivered to the dwelling unit distribution equipment when there is no call from the thermostat	☐	☐	☐	☐
5.11 Terminal units in hydronic distribution systems are equipped with pressure independent balancing valves or pressure independent control valves	☐	☐	☐	☐
5.12 Piping of a heating or cooling system is insulated in accordance with ASHRAE 90.1-2007, Table 6.8.3, including where passing through planks or any other penetrations	☐	☐	☐	☐
5.13 For circulating pumps serving hydronic heating or cooling systems with three-phase motors, 1 horse-power or larger, motors meet or exceed efficiency standards for NEMA Premium™ motors. If 5 horse-power or larger, also specified with variable frequency drives	☐	☐	☐	☐
6. Duct Quality Installation *- Applies to Heating, Cooling, Ventilation, Exhaust, & Pressure Balancing Ducts, Unless Noted in Footnote*		**Must Correct**	**Rater Verified [4]**	**N/A [5]**
6.1 Ductwork installed without kinks, sharp bends, compressions, or excessive coiled flexible ductwork [36]		☐	☐	☐
6.2 Bedrooms with a design airflow ≥ 150 CFM pressure-balanced using any combination of transfer grills, jump ducts, dedicated return ducts, and / or undercut doors to achieve a Rater-measured pressure differential ≤ 5 Pa with respect to the main body of the house when the bedroom door is closed and all air handlers are operating. [37]		☐	☐	☐
6.3 All supply and return ducts <u>not</u> in conditioned space, including connections to trunk ducts, are insulated to ≥ R-6 [38]		☐	☐	☐
6.3.1 Prescriptive Path: Dwelling unit ductwork meets the location and insulation requirements specified in the ENERGY STAR MF Reference Design.		☐	☐	☐
6.4 Rater-measured total duct leakage meets one of the following two options.[39]				
6.4.1 <u>Rough-in</u>: Tested per allowances below, with air handler & all ducts, building cavities used as ducts, & duct boots installed. In addition, <u>all</u> duct boots sealed to finished surface, Rater-verified at final. [40]		☐	☐	☐

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No ducted returns[41]: The greater of ≤ 3 CFM25 per 100 sq. ft. of CFA or ≤ 30 CFM. Additionally, the Rater-measured pressure difference between the space containing the air handler and the conditioned space is <= 5 Pa with the air handler running at high speed. One or two ducted returns[41]: The greater of ≤ 4 CFM25 per 100 sq. ft. of CFA or ≤ 40 CFM Three or more ducted returns[41]: The greater of ≤ 6 CFM25 per 100 sq. ft. of CFA or ≤ 60 CFM			
6.4.2 Final: Tested per allowances below, with the air handler & all ducts, building cavities used as ducts, duct boots, & register grilles atop the finished surface (e.g., drywall, floor) installed.[42] No ducted returns[41]: The greater of ≤ 6 CFM25 per 100 sq. ft. of CFA or ≤ 60 CFM. Additionally, the Rater-measured pressure difference between the space containing the air handler and the conditioned space is <= 5 Pa with the air handler running at high speed. One or two ducted returns[41]: The greater of ≤ 8 CFM25 per 100 sq. ft. of CFA or ≤ 80 CFM Three or more ducted returns[41]: The greater of ≤ 12 CFM25 per 100 sq. ft. of CFA or ≤ 120 CFM	☐	☐	☐
6.5 Common Space: Supply, return, and exhaust ductwork and all plenums are sealed at all transverse joints, longitudinal seams, and duct wall penetrations. Pressure-sensitive tape is used as the primary sealant, only where certified to comply with UL-181A or UL-181B by an independent testing laboratory and then used in accordance with that certification[39]	☐	☐	☐
6.6 Central exhaust systems that serve four or more dwelling units tested for duct leakage, where the leakage at rough-in (e.g. including trunks, branches, and take-offs) does not exceed 25% of exhaust fan flow or 30% of exhaust fan flow at final (e.g. inclusive of all ductwork between the fan and the grilles).[43]	☐	☐	☐
7. Dwelling-Unit & Common Space Mechanical Ventilation System			
7.1 Rater-measured ventilation rate is within either ± 15 CFM or ±15% of design values (2.6) [44]	☐	☐	-
7.2 No outdoor air intakes connected to return side of the dwelling unit HVAC system, unless controls are installed to operate intermittently & automatically based on a timer and to restrict intake when not in use (e.g., motorized damper)	☐	☐	-
7.3 If located in the dwelling unit, system fan rated ≤ 3 sones if intermittent and ≤ 2 sone if continuous, or exempted[45]	☐	☐	-
7.4 If system utilizes the dwelling unit HVAC fan, then the specified fan type is ECM / ICM (4.10), or the controls will reduce the standalone ventilation run-time by accounting for hours when the HVAC system is heating or cooling	☐	☐	☐
7.5 In-unit bathroom fans or in-line fans are ENERGY STAR certified if used as part of the dwelling-unit mechanical ventilation system [46]	☐	☐	☐
7.6 If central exhaust fans, ≤ 1 HP, are specified as part of the dwelling-unit mechanical ventilation system, then they are direct-drive, ECM, with variable speed controllers. If greater than 1 HP, they are specified with NEMA Premium Motors	☐	☐	☐
7.7 Air inlet location (Complete if ventilation air inlet location was specified (2.21, 2.22); otherwise check "N/A"): [47, 48]	-	-	☐
7.7.1 Inlet pulls ventilation air directly from outdoors and not from attic, crawlspace, garage, or adjacent dwelling unit	☐	☐	-
7.7.2 Inlet is ≥ 2 ft. above grade or roof deck; ≥ 10 ft. of stretched-string distance from known contamination sources (e.g., stack, vent, exhaust, vehicles) not exiting the roof, and ≥ 3 ft. distance from sources exiting the roof	☐	☐	-
8. Local Mechanical Exhaust			
Dwelling Unit Mechanical exhaust - In each dwelling unit kitchen and bathroom, a system is installed that exhausts directly to the outdoors and meets one of the following Rater-measured airflow and manufacturer-rated sound level standards: [44, 49]			
Location	**Continuous Rate**	**Intermittent Rate** [50]	
8.1 Kitchen — Airflow	≥ 5 ACH, based on kitchen volume [51, 52]	≥ 100 CFM and, if not integrated with range, also ≥ 5 ACH based on kitchen volume [51, 52, 53]	☐ ☐ -
8.1 Kitchen — Sound	Recommended: ≤ 1 sone	Recommended: ≤ 3 sones	
8.2 Bathroom — Airflow	≥ 20 CFM	≥ 50 CFM	☐ ☐ -
8.2 Bathroom — Sound	Required: ≤ 2 sone	Recommended: ≤ 3 sones	
Common Space Mechanical Exhaust			
8.3 Measured ventilation rate is within either ± 15 CFM or ±15% of design values (2c) [44]			☐ ☐ ☐
8.4 Parking garage exhaust ventilation system is equipped with controls that sense CO and NO2			☐ ☐ ☐
9. Filtration			
9.1 At least one MERV 6 or higher filter installed in each ducted mechanical system serving an individual dwelling unit in a location that facilitates access and regular service by the occupant or building owner [54]			☐ ☐ ☐
9.1.1 Filter access panel includes gasket or comparable sealing mechanism and fits snugly against the exposed edge of filter when closed to prevent bypass [55]			☐ ☐ ☐
9.1.2 All return air and mechanically supplied outdoor air passes through filter prior to conditioning			☐ ☐ ☐
10. Combustion Appliances			
10.1 Furnaces, boilers, and water heaters located within the building's pressure boundary are mechanically drafted or direct-vented. If mechanically drafted, the minimum volume of combustion air required for safe operation by the manufacturer and/or code shall be met or exceeded and make-up air sources must be mechanically closed when the combustion appliance is not in operation. See Footnote 58 for alternatives. [56, 57, 58]			☐ ☐ ☐
10.2 Fireplaces located within the building's pressure boundary are direct-vented.[56, 57]			☐ ☐ ☐
10.3 No unvented combustion appliances other than cooking ranges or ovens are located inside the building's			☐ ☐ ☐

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pressure boundary. For cooking ranges and ovens, local mechanical exhaust per Checklist Item 8.1 requirements must be met [56]				
Other	**Must Correct**	**LP Verified[35]**	**Rater Verified [4]**	**N/A [5]**
11. Domestic Hot Water				
11.1 Prescriptive Path: Hot water equipment rated in EF or UEF meet the efficiency levels specified in the ENERGY STAR MF Reference Design. Boilers providing hot water are ≥85% Et.[59]	☐	-	☐	☐
11.2 HERS: Hot water equipment rated in EF or UEF serving common spaces but not dwelling units nor shared laundry meet the efficiency levels specified in the ENERGY STAR MF Reference Design. Boilers providing hot water are ≥85% Et. [59]	☐	-	☐	☐
11.3 For in-unit storage water heaters, AHRI Certificate confirms the presence of a heat trap	☐	-	☐	☐
11.4 DHW piping[60] is insulated with a minimum of R-3	☐	☐	☐	-
11.5 Rater-measured temperatures at faucets and showerheads do not exceed 125°F	☐	-	☐	-
12. Lighting				
12.1 Common Space Occupancy Controls: Meet one of the following:				
12.2.1: HERS and Prescriptive: Automatic bi-level controls or occupancy sensors in all common spaces and garages, except the building lobby and where automatic shutoff would endanger the safety of occupants, must have occupancy sensors or automatic bi-level lighting controls; **OR**	☐	☐	☐	☐
12.2.2: ASHRAE path only: All common spaces and garages, except those intended for 24-hour operation or where automatic shutoff would endanger the safety of occupants, must have occupancy sensors or automatic bi-level lighting controls	☐	☐	☐	☐
12.2 Common Space Lighting Power Density Maximum: Meet one of the following[61]:				
12.2.1 HERS and Prescriptive: Specified lighting power for common spaces must not exceed ASHRAE 90.1-2007 space by space lighting power density allowances; **OR**	☐	☐	☐	☐
12.2.2 HERS and Prescriptive: Total combined specified lighting power density must not exceed 1 W/ft^2 ; **OR**	☐	☐	☐	☐
12.2.3 ASHRAE path only: Specified lighting power for common spaces must not exceed ASHRAE 90.1-2007 space by space lighting power density allowances by more than 20%	☐	☐	☐	☐
12.3 Parking garages and parking lots do not exceed the ASHRAE 90.1-2007 parking lighting power density allowances by more than 20%	☐	☐	☐	☐
12.4 Exterior lighting controls: Fixtures must include automatic switching on timers or photocell controls except fixtures intended for 24-hour operation, required for security, or located on dwelling unit balconies	☐	☐	☐	☐
12.5 HERS Path: All exterior and common space lighting fixtures meet the efficiency requirements in the ENERGY STAR MF Reference Design, except fixtures located on dwelling unit balconies	☐	-	☐	☐
12.6 Prescriptive Path: Lighting in dwelling units and common spaces meet the efficiency requirements in the ENERGY STAR Reference Design[62]	☐	-	☐	☐
12.7 Prescriptive Path: Dwelling unit overall in-unit lighting power density ≤ 0.75 W/ft^2. When calculating overall lighting power density, use 1.1 W/ft^2 where lighting is not installed [61]	☐	-	☐	☐
13. Appliances, Ceiling Fans, and Plumbing Fixtures		**Must Correct**	**Rater Verified 4**	**N/A 5**
13.1 Prescriptive Path: Specified appliances, ceiling fans, and plumbing fixtures in dwelling units and common spaces meet the criteria in the ENERGY STAR MF Reference Design[63]		☐	☐	☐
13.2 HERS Path: Specified appliances, ceiling fans, and plumbing fixtures in common areas, and not included in the HERS model, meet the criteria in the ENERGY STAR MF Reference Design[63]		☐	☐	☐
13.3 Prescriptive Path: Shower compartments with multiple fixtures cannot be operated simultaneously OR the average flow rate per shower compartment must not exceed 1.75 gallons per minute, as rated at 80 psi.		☐	☐	☐
14. Whole Building Energy Consumption Data Acquisition				
14.1 For buildings with ≥50 units, an energy monitor, data acquisition system, or utility-owned energy meter is installed that can collect building-level data representing total monthly building energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, etc.)[64]		☐	☐	☐

Rater Name: _____ Rater Pre-Drywall Inspection Date: _____ Rater Initials: _____

Rater Name: _____ Rater Final Inspection Date: _____ Rater Initials: _____

Builder Employee: _____ Builder Inspection Date: _____ Builder Initials: _____

Licensed Professional: _____ LP Inspection Date: _____ LP Initials: _____

Rater Design Review Checklist Footnotes

1. This Checklist applies to all dwelling units, sleeping units, and common spaces on the property. This Checklist does not apply to commercial or retail spaces or common spaces[2] in buildings without any dwelling or sleeping units. The term 'sleeping unit' refers to a room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Where the term 'dwelling unit' is used in this Checklist, the requirement is also required of 'sleeping' units.
2. The term 'common space' refers to any spaces on the property that serve a function in support of the residential part of the building that is not part of a dwelling or sleeping unit. This includes spaces used by residents, such as corridors, stairs, lobbies, laundry rooms, exercise rooms, residential recreation rooms, parking garages or lots used exclusively by residents, building staff, and their guests. This also includes offices used by building management, administration or maintenance and all special use areas located on the property to serve and support the residents such as day-care facilities, gyms, dining halls, etc.
3. The term 'Rater' refers to the person completing the third-party inspections required for certification. This person shall: a) be a Certified Rater, Approved Inspector, or an equivalent designation as determined by a "Multifamily Oversight Organization" and, b) have attended and successfully completed an EPA-recognized training class. See energystar.gov/newhomestraining. (Note: Link not updated)
4. "FT Agents" must be a Licensed Professional (a Registered Architect or Professional Engineer in good standing and with a current license), a Certified Commissioning Professional (CCP), a Certified Building Commissioning Professional (CBCP), a Building Commissioning Professional (BCxP, formerly the Commissioning Process Management Professional (CPMP)), a representative of the Original Equipment Manufacturer (OEM), or a contractor credentialed by an HVAC Quality Installation Training and Oversight Organization (H-QUITO) An explanation of the credentialing process and links to H-QUITOs, which maintain lists of credentialed contractors, can be found at energystar.gov/newhomeshvac.
5. All windows, doors and skylights must meet or exceed the U-factor and SHGC requirements specified in the table below. If no NFRC rating is noted on the window or in product literature (e.g., for site-built fenestration), select the U-factor and SHGC value from Tables 4 and 10, respectively, in 2013 ASHRAE Handbook of Fundamentals, Chapter 15. Select the highest U-factor and SHGC value among the values listed for the known window characteristics (e.g., frame type, number of panes, glass color, and presence of low-e coating). Note that the U-factor requirement applies to all fenestration while the SHGC only applies to the glazed portion.

	Dwelling Unit – not "Class AW"*	Dwelling unit windows that are classified as "Class AW"*	Common Space
HERS	2009 IECC Table 402.1.1	2009 IECC Table 502.3	ENERGY STAR MF Reference Design – for Class AW
ASHRAE	2009 IECC Table 402.1.1	2009 IECC Table 502.3	2009 IECC Table 502.3
Prescriptive	ENERGY STAR MF Reference Design	ENERGY STAR MF Reference Design – for Class AW	ENERGY STAR MF Reference Design – for Class AW

* Classified as "Class AW" under the North American Fenestration Standard skylights (AAMA/WDMA/ CSA 101/I.S.2/A440)

The following exemptions apply:

i. An area-weighted average of fenestration products shall be permitted to satisfy the U-factor requirements;
ii. An area-weighted average of fenestration products ≥ 50% glazed shall be permitted to satisfy the SHGC requirements; and
iii. 5% of all combined fenestration area (glazed and opaque) shall be exempt from the U-factor and SHGC requirements, and shall be excluded from area-weighted averages calculated using i) and ii), above.

In Passive House (PHIUS+) certified buildings, where triple-glazed window assemblies with thermal breaks / spacers between the panes are used, such windows meet the intent of Items 2.1 and 2.2 and shall be excluded when assessing compliance of a) through d), above.

6. Where the term 'ceiling' is used, the component insulation levels for "roofs" shall be used and does not apply to adiabatic ceilings, such as the insulated or uninsulated ceiling between two dwelling units in a multistory building.
7. Items 3.1 and 3.2 is applicable to walls that are adjacent to other buildings.
8. Specified levels shall meet or exceed the component insulation levels in 2009 IECC Table 502.2(1). The following exceptions apply:
   a. For ceilings with attic spaces, R-30 shall satisfy the requirement for R-38 and R-38 shall satisfy the requirement for R-49 wherever the full height of uncompressed insulation at the lower R-value extends over the wall top plate at the eaves. This exemption shall not apply if the alternative calculations in c) are used;
   b. For ceilings without attic spaces, that are not roofs with insulation above deck, R-30 shall satisfy the requirement for any required value above R-30 if the design of the roof / ceiling assembly does not provide sufficient space for the required insulation value. This exemption shall be limited to 20% of the total insulated ceiling area. This exemption shall not apply if the alternative calculations in c) are used;
   c. An alternative equivalent U-factor or total UA calculation may also be used to demonstrate compliance, as follows:

      An assembly with a U-factor equal or less than specified in 2009 IECC Table 502.1.2 complies.

      A total building thermal envelope UA that is less than or equal to the total UA resulting from the U-factors in Table 502.1.2 also complies. The performance of all components (i.e., roofs, walls, floors, slabs-on-grade, and fenestration) can be traded off using the UA approach. Note that Items 1.5, 1.6, and 2.1 through 2.6 of the Rater Field Checklist shall be met regardless of the UA tradeoffs calculated. The UA calculation shall be done using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The calculation for a steel-frame envelope assembly shall use the ASHRAE zone method or a method providing equivalent results, and not a series-parallel path calculation method.
9. Consistent with the 2009 IECC, slab edge insulation is only required for slab-on-grade floors with a floor surface less than 24 inches below grade. Slab-on-grade perimeter insulation shall extend to the top of the slab to provide a complete thermal break. If the top edge of the insulation is installed between the exterior wall and the edge of the interior slab, it shall be permitted to be cut at a 45-degree angle away from the exterior wall. Alternatively, the thermal break is permitted to be created using ≥ R-3 rigid insulation on top of an existing slab (e.g., in a building undergoing a gut rehabilitation). In such cases, up to 10% of the slab surface is permitted to not be insulated (e.g., for sleepers, for sill plates). Insulation installed on top of slab shall be covered by a durable floor surface (e.g., hardwood, tile, carpet).

10. Where an insulated wall separates a garage, patio, porch, or other unconditioned space from the conditioned space of the building, slab perimeter insulation shall also be installed at this interface to provide a thermal break between the conditioned and unconditioned slab, if the slab is in contact with the ground at that interface. Where specific details cannot meet this requirement, partners shall provide the detail to EPA to request an exemption prior to the building's certification. EPA will compile exempted details and work with industry to develop feasible details for use in future revisions to the program. A list of currently exempted details is available at: energystar.gov/slabedge.
11. The Rater shall collect one HVAC Design Report per building/project. Regardless of whether the "unit-specific design", "group design", or "worst-case design" box has been checked in Item 3.2 of the HVAC Design Report, the system design as documented on the HVAC Design Report must fall within the tolerances in Item 4.2 for the unit to be certified. The Rater is only responsible for verifying that the designer has not left any items blank on the HVAC Design Report and for verifying the discrete objective parameters in Item 4.2 of this Checklist, not for verifying the accuracy of every input on the HVAC Design Report.
12. Rater's may use this table to determine the maximum ventilation rate allowed.

	Bedrooms				
Floor area	1	2	3	4	5
<500	45	57	67.5	79.5	90
501-1000	67.5	79.5	90	102	112.5
1001-1500	90	102	112.5	124.5	135
1501-2000	112.5	124.5	135	147	157.5
2001-2500	135	147	157.5	169.5	180
2501-3000	157.5	169.5	180	192	202.5
3001-3500	180	192	202.5	214.5	225
3501-4000	202.5	214.5	225	237	247.5
4001-4500	225	237	247.5	259.5	270
4501-5000	247.5	259.5	270	282	292.5

13. Visit energystar.gov/hvacdesigntemps for the maximum cooling season design temperature and minimum heating season design temperature permitted for ENERGY STAR certified homes and the process for a designer to obtain an allowance from EPA. The same design report is permitted to be used in other counties, as long as the design temperature limits in those other counties meet or exceed the cooling and heating season temperature limits for the county selected. For example, if Fauquier County, VA, is used for the load calculations, with a 1% cooling temperature limit of 93 F, then the same report could be used in Fairfax County (which has a higher limit of 94 F) but not in Arlington County (which has a lower limit of 92 F).
14. To determine the number of occupants among all HVAC systems in the dwelling unit, calculate the number of bedrooms, as defined by ANSI 301, and add one. The number of occupants used in loads must be within ± 2 of the dwelling unit to be certified, unless Item 1.5 of the HVAC Design Report indicates that the system is a cooling system for temporary occupant loads.

    A bedroom is defined by ANSI 301 as a room or space 70 sq. ft. or greater size, with egress window and closet, used or intended to be used for sleeping. A "den", "library", or "home office" with a closet, egress window, and 70 sq. ft. or greater size or other similar rooms shall count as a bedroom, but living rooms and foyers shall not. (This definition could be updated by future revisions to ANSI 301.)

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

    - have a sill height of not more than 44 inches above the floor; AND
    - have a minimum net clear opening of 5.7 sq. ft.; AND
    - have a minimum net clear opening height of 24 in.; AND
    - have a minimum net clear opening width of 20 in.; AND
    - be operational from the inside of the room without the use of keys, tools or special knowledge.
15. "Predominant" is defined as the SHGC value used in the greatest amount of window area in the dwelling unit.
16. Orientation represents the direction that the front door of the dwelling unit is facing. The designer is only required to document the loads for the orientation(s) that the dwelling unit might be built in. For example, if a unit plan will only be built in a specific orientation (e.g., facing South), then the designer only needs to document the loads for this one orientation.
17. Existing sill plates (e.g., in a building undergoing a gut rehabilitation) on the interior side of structural masonry or monolithic walls may not be able to complete this Item. In addition, other existing sill plates resting atop concrete or masonry and adjacent to conditioned space can in lieu of using a gasket, be sealed with caulk, foam, or equivalent material at both the interior seam between the sill plate and the subfloor and the seam between the top of the sill plate and the sheathing.
18. This Revision of the Rater Design Review Checklist is required to certify all multifamily projects permitted after TBD, but is allowed to be used for any multifamily projected permitted or completed prior to this date. The Rater may define the 'permit date' as either the date that the permit was issued or the application date of the permit. In cases where permit or application dates are not available, Providers or Multifamily Oversight Organizations have discretion to estimate permit dates based on other construction schedule factors. These assumptions should be both defensible and documented.
19. In Climate Zones 1 through 3, a continuous stucco cladding system sealed to windows and doors is permitted to be used in lieu of sealing rough openings with caulk or foam.

20. Examples of durable covers include, but are not limited to, pre-fabricated covers with integral insulation, rigid foam adhered to cover with adhesive, or batt insulation mechanically fastened to the cover (e.g., using bolts, metal wire, or metal strapping).
21. Recommended air leakage paths to be sealed include, but are not limited to the following:
    a. Plumbing penetrations, including those from water piping, drain waste and vent piping, HVAC piping, gas line piping, and sprinkler heads.
    b. Electrical penetrations, including those for receptacle outlets, lighting outlets/fixtures, communications wiring, thermostats, and smoke alarms.
    c. HVAC penetrations, including those for fans and for exhaust, supply, transfer, and return air ducts.
    d. Envelope penetrations, including at the intersection of baseboard trim and floor, at the intersection of walls and ceilings, around window trim and dwelling unit doors, including the door latch hole.

Rater Field Checklist Footnotes

1. This Checklist applies to all dwelling units, sleeping units, and common spaces on the property. This Checklist does not apply to commercial or retail spaces or common spaces[2] in buildings without any dwelling or sleeping units. The term 'sleeping unit' refers to a room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Where the term 'dwelling unit' is used in this Checklist, the requirement is also required of 'sleeping' units.
2. The term 'common space' refers to any spaces on the property that serve a function in support of the residential part of the building that is not part of a dwelling or sleeping unit. This includes spaces used by residents, such as corridors, stairs, lobbies, laundry rooms, exercise rooms, residential recreation rooms, parking garages or lots used exclusively by residents, building staff, and their guests. This also includes offices used by building management, administration or maintenance and all special use areas located on the property to serve and support the residents such as day-care facilities, gyms, dining halls, etc.
3. At the discretion of the Rater, the builder or developer may verify up to eight items in Sections 1-4 of this Checklist. For the purpose of this Checklist, "Builder" represents either the builder or the developer. When exercised, the builder's responsibility will be formally acknowledged by the builder signing off on the checklist for the item(s) that they verified. However, if a quality assurance review indicates that Items have not been successfully completed, the Rater will be responsible for facilitating corrective action.
4. The term 'Rater' refers to the person completing the third-party inspections required for certification. This person shall: a) be a Certified Rater, Approved Inspector, or an equivalent designation as determined by a "Multifamily Oversight Organization" and, b) have attended and successfully completed an EPA-recognized training class. See energystar.gov/newhomestraining. (Note: Link not updated)
5. The column titled "N/A," which denotes items that are "not applicable," should be used when the checklist Item is not present in the project or conflicts with local requirements.
6. Two alternatives are provided: a) Grade II cavity insulation is permitted to be used for assemblies that contain a layer of continuous, air impermeable insulation ≥ R-3 in Climate Zones 1 to 4, ≥ R-5 in Climate Zones 5 to 8; b) Grade II batts are permitted to be used in floors if they fill the full depth of the floor cavity, even when compression occurs due to excess insulation, as long as the R-value of the batts has been appropriately assessed based on manufacturer guidance and the only defect preventing the insulation from achieving Grade I is the compression caused by the excess insulation.
7. Window-to-Wall ratio is taken as the sum of all window area divided by the total exterior above-grade wall area. All decorative glass and skylight window area contribute to the total window area to above-grade wall ratio (WWR). Spandrel sections of curtain wall systems contribute to the above-grade wall area.
8. Compliance with Items 1.5 and 1.6 is not required for ASHRAE projects, but the energy used by the heating systems must be modeled following the requirements in the simulation guidelines.
9. The plenum 'floor' is permitted to be suspended ceiling tiles or other non-air barrier material.
10. The minimum designated R-values must be achieved regardless of the trade-offs determined using an equivalent U-factor or UA alternative calculation.

    Note that if the minimum designated values are used, then higher insulation values may be needed elsewhere to meet Item 1.2. Also, note that these requirements can be met by using any available strategy, such as a raised-heel truss, alternate framing that provides adequate space, and / or high-density insulation.
11. Consistent with the 2009 IECC, slab edge insulation is only required for slab-on-grade floors with a floor surface less than 24 inches below grade. Slab-on-grade perimeter insulation shall extend to the top of the slab to provide a complete thermal break. If the top edge of the insulation is installed between the exterior wall and the edge of the interior slab, it shall be permitted to be cut at a 45-degree angle away from the exterior wall. Alternatively, the thermal break is permitted to be created using ≥ R-3 rigid insulation on top of an existing slab (e.g., in a building undergoing a gut rehabilitation). In such cases, up to 10% of the slab surface is permitted to not be insulated (e.g., for sleepers, for sill plates). Insulation installed on top of slab shall be covered by a durable floor surface (e.g., hardwood, tile, carpet).
12. Where an insulated wall separates a garage, patio, porch, or other unconditioned space from the conditioned space of the building, slab perimeter insulation shall also be installed at this interface to provide a thermal break between the conditioned and unconditioned slab, if the slab is in contact with the ground at that interface. Where specific details cannot meet this requirement, partners shall provide the detail to EPA to request an exemption prior to the building's certification. EPA will compile exempted details and work with industry to develop feasible details for use in future revisions to the program. A list of currently exempted details is available at: energystar.gov/slabedge.
13. For projected balconies, install a minimum of R-5 slab edge insulation to provide a thermal break between conditioned space and the unconditioned projected balcony slab. Alternatively, a UA calculation for the wall assembly that accounts for this uninsulated projected slab must be performed to demonstrate compliance with Item 1.2. For the purpose of this UA calculation, the area of the wall that is uninsulated due to the projected balcony is required to be calculated as 400% of that actual area. For example, for a projected balcony that is 20 feet wide, and has a thickness of 1 foot, the area to be used in the UA calculation is 80 ft^2 instead of 20 ft^2. The distance the balcony projects from the building is not used in this calculation.

14. Whether insulating from above or below the slab, thermal breaks must be accounted for when determining compliance with floor U-factors. Where structural columns cause a discontinuity in the installed floor insulation, the UA calculation for the floor assembly must account for this uninsulated area of the floor. For the purpose of this UA calculation, the area of the floor that is uninsulated due to the structural columns is required to be calculated as 400% of that actual area. For example, for a 4'x4' column, the area to be used in the UA calculation is 64 ft^2 instead of 16 ft^2. The height of the column is not used in this calculation. Alternatively, if the structural column is insulated for a minimum of 4 vertical feet, the modification to the UA calculation is not required, and the U-value of the column insulation shall be associated with the uninsulated area of the floor due to the column.
15. Mass walls utilized as the thermal mass component of a passive solar design (e.g., a Trombe wall) are exempt from this Item. To be eligible for this exemption, the passive solar design shall be comprised of the following five components: an aperture or collector, an absorber, thermal mass, a distribution system, and a control system. For more information, see: energy.gov/sites/prod/files/guide_to_passive_solar_home_design.pdf.

    Mass walls that are not part of a passive solar design (e.g., CMU block or log home enclosure) shall either utilize the strategies outlined in Item 2.6 or the pathway in the assembly with the least thermal resistance, as determined using a method consistent with the 2013 ASHRAE Handbook of Fundamentals, shall provide ≥ 50% of the applicable assembly resistance, defined as the reciprocal of the mass wall equivalent U-factor in the 2009 IECC Table 502.1.2. Documentation identifying the pathway with the least thermal resistance and its resistance value shall be collected by the Rater and any Builder Verified or Rater Verified box under Item 3.4 shall be checked.
16. Up to 5% of the total exterior wall surface area is exempted from the reduced thermal bridging requirements to accommodate intentional designed details (e.g., architectural details such as thermal fins, wing walls, or masonry fireplaces; but not structural details, such as steel columns). It shall be apparent to the Rater that the exempted areas are intentional designed details or the exempted area shall be documented in a plan provided by the builder, architect, or engineer. The Rater need not evaluate the necessity of the designed detail to certify the project.
17. If used, insulated siding shall be attached directly over a water-resistive barrier and sheathing. In addition, it shall provide the required R-value as demonstrated through either testing in accordance with ASTM C 1363 or by attaining the required R-value at its minimum thickness. Insulated sheathing rated for water protection can be used as a water resistant barrier if all seams are taped and sealed. If non-insulated structural sheathing is used at corners, the advanced framing details listed in Item 2.6.3 shall be met for those wall sections.
18. Steel framing shall meet the reduced thermal bridging requirements by complying with Item 2.6.1 of the Checklist.
19. Double-wall framing is defined as any framing method that ensures a continuous layer of insulation covering the studs to at least the R-value required in Item 2.6.1 of the Checklist, such as offset double-stud walls, aligned double-stud walls with continuous insulation between the adjacent stud faces, or single-stud walls with 2x2 or 2x3 cross-framing. In all cases, insulation shall fill the entire wall cavity from the interior to exterior sheathing except at windows, doors and other penetrations.
20. Rim / band joists are exempt from this requirement. All 'advanced framing' details shall be met except where the builder, architect, or engineer provides a framing plan that encompasses the details in question, indicating that structural members are required at these locations and including the rationale for these members (e.g., full-depth solid framing is required at wall corners or interior / exterior wall intersections for shear strength, a full-depth solid header is required above a window to transfer load to jacks studs, additional jack studs are required to support transferred loads, additional cripple studs are required to maintain on-center spacing, or stud spacing must be reduced to support multiple stories in a multifamily building). The Rater shall retain a copy of the detail and rationale for their records, but need not evaluate the rationale to certify the building.
21. All exterior corners shall be constructed to allow access for the installation of ≥ R-6 insulation that extends to the exterior wall sheathing. Examples of compliance options include standard-density insulation with alternative framing techniques, such as using three studs per corner, or high-density insulation (e.g., spray foam) with standard framing techniques.
22. Compliance options include continuous rigid insulation sheathing, SIP headers, other prefabricated insulated headers, single-member or two-member headers with insulation either in between or on one side, or an equivalent assembly. R-value requirement refers to manufacturer's nominal insulation value.
23. Insulation shall run behind interior / exterior wall intersections using ladder blocking, full length 2x6 or 1x6 furring behind the first partition stud, drywall clips, or other equivalent alternative.
24. For purposes of this Checklist, an air barrier is defined as any durable solid material that blocks air flow between conditioned space and unconditioned space, including necessary sealing to block excessive air flow at edges and seams and adequate support to resist positive and negative pressures without displacement or damage. EPA recommends, but does not require, rigid air barriers.

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

    If flexible air barriers such as house wrap are used, they shall be fully sealed at all seams and edges and supported using fasteners with caps or heads ≥ 1 in. diameter unless otherwise indicated by the manufacturer. Flexible air barriers shall not be made of kraft paper, paper-based products, or other materials that are easily torn. If polyethylene is used, its thickness shall be ≥ 6 mil.
25. All insulated ceiling surfaces, regardless of slope (e.g., cathedral ceilings, tray ceilings, conditioned attic roof decks, flat ceilings, sloped ceilings), must meet the requirements for ceilings, unless the ceiling is adiabatic.
26. All insulated vertical surfaces are considered walls (e.g., above and below grade exterior walls, knee walls) and must meet the air barrier requirements for walls. The following exceptions apply: air barriers recommended, but not required, in adiabatic walls; and, in Climate Zones 4 through 8, an air barrier at the interior vertical surface of insulation is recommended but not required in basement walls or crawlspace walls. For the purpose of these exceptions, a basement or crawlspace is a space for which ≥ 40% of the total gross wall area is below-grade.
27. EPA highly recommends, but does not require, an air barrier at the interior vertical surface of floor insulation in Climate Zones 4-8.
28. Examples of supports necessary for permanent contact include staves for batt insulation or netting for blown-in insulation. Alternatively, supports are not required if batts fill the full depth of the floor cavity, even when compression occurs due to excess insulation, as long as the R-value of the batts has been appropriately assessed based on manufacturer guidance and the only defect preventing the insulation from achieving the required installation grade is the compression caused by the excess insulation.

29. Alternatively, an air barrier is permitted to be installed at the exterior horizontal surface of the floor insulation if the insulation is installed in contact with this air barrier, the exterior vertical surfaces of the floor cavity are also insulated, and air barriers are included at the exterior vertical surfaces of this insulation.
30. This Revision of the Rater Field Checklist is required to certify all multifamily projects permitted after TBD, but is allowed to be used for any multifamily projected permitted or completed prior to this date. The Rater may define the 'permit date' as either the date that the permit was issued or the application date of the permit. In cases where permit or application dates are not available, Providers or Multifamily Oversight Organizations have discretion to estimate permit dates based on other construction schedule factors. These assumptions should be both defensible and documented.
31. In Climate Zones 1 through 3, a continuous stucco cladding system sealed to windows and doors is permitted to be used in lieu of sealing rough openings with caulk or foam.
32. This section of the Checklist is designed to meet the requirements of ASHRAE 62.1-2010 / 2013, ASHRAE 62.2-2010 / 2013, and ANSI / ACCA's 5 QI-2015 protocol, thereby improving the performance of HVAC equipment in new multifamily buildings when compared to multifamily buildings built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, and HVAC problems, (e.g., those caused by a lack of maintenance by occupants). Therefore, this Checklist is not a guarantee of proper ventilation, indoor air quality, or HVAC performance.
33. If installed equipment does not match the HVAC Design Report, then prior to certification the Rater shall obtain written approval from the designer (e.g., email, updated HVAC Design Report) confirming that the installed equipment meets the requirements of the HVAC Design Report. In cases where the condenser unit is installed after the time of inspection by the Rater, the HVAC manufacturer and model numbers on installed equipment can be documented through the use of photographs provided by the "FT Agent" after installation is complete.
34. The Rater shall measure and record the external static pressure in the return-side and supply-side of the system using the contractor-provided test locations. However, at this time, the Rater need not assess whether these values are within a specific range to certify the dwelling unit.
35. At the discretion of the Rater, a Licensed Professional (LP), a Registered Architect or Professional Engineer in good standing and with a current license, may verify up to ten items in Sections 5, 11 and12 of this Checklist. When exercised, the LP's responsibility will be formally acknowledged by the LP signing off on the checklist for the item(s) that they verified. However, if a quality assurance review indicates that Items have not been successfully completed, the Rater will be responsible for facilitating corrective action.
36. Kinks are to be avoided and are caused when ducts are bent across sharp corners such as framing members. Sharp bends are to be avoided and occur when the radius of the turn in the duct is less than one duct diameter. Compression is to be avoided and occurs when flexible ducts in unconditioned space are installed in cavities smaller than the outer duct diameter and ducts in conditioned space are installed in cavities smaller than inner duct diameter. Ducts shall not include coils or loops except to the extent needed for acoustical control.
37. Item 6.2 does not apply to ventilation or exhaust ducts. For an HVAC system with a multi-speed fan, the highest design fan speed shall be used when verifying this requirement. The Rater-measured pressure shall be rounded to the nearest whole number to assess compliance.
38. Item 6.3 does not apply to ducts that are a part of local mechanical exhaust or exhaust-only dwelling-unit mechanical ventilation systems. EPA recommends, but does not require, that all metal ductwork not encompassed by Section 6 (e.g., exhaust ducts, duct boots, ducts in conditioned space) also be insulated and that insulation be sealed to duct boots to prevent condensation.
39. Items 6.4 and 6.5 only apply to heating, cooling, and balanced ventilation ducts. Duct leakage shall be determined and documented by a Rater using a RESNET-approved testing protocol. Leakage limits shall be assessed on a per-system, rather than per-dwelling unit, basis. For *balanced ventilation ducts* that are not connected to space heating or cooling systems, a Rater is permitted to visually verify, in lieu of duct leakage testing, that all seams and connections are sealed with mastic or metal tape and all duct boots are sealed to floor, wall, or ceiling using caulk, foam, or mastic tape.
40. Cabinets (e.g., kitchen, bath, multimedia) or ducts that connect duct boots to toe-kick registers are not required to be in place during the 'rough-in' test.
41. A 'ducted return' is defined as a continuous duct made of sheet metal, duct board, or flexible duct that connects one or more return grilles to the return-side inlet of the air handler. Any other approach to convey air from return or transfer grille(s) to the air handler, such as the use of building cavities, does not constitute a 'ducted return'.
42. Registers atop carpets are permitted to be removed and the face of the duct boot temporarily sealed during testing. In such cases, the Rater shall visually verify that the boot has been durably sealed to the subfloor (e.g., using duct mastic or caulk) to prevent leakage during normal operation.
43. Exhaust fan flow shall be the lesser of the rated fan flow and at rough-in, 133% of the sum of the design airflow of the dwelling units that are exhausted by that central fan or at final, 143% of the sum of the design airflow of the dwelling units that are exhausted by that central fan.
44. The ventilation air flow and exhaust air flows shall be measured by the Rater in accordance with ANSI 380. For common spaces not under the scope of ANSI 380, airflows shall be measured using the same procedure.
45. Dwelling-unit mechanical ventilation fans shall be rated for sound at no less than the airflow rate in Item 2.6 of the HVAC Design Report. Fans exempted from this requirement include HVAC air handler fans, remote-mounted fans, and intermittent fans rated ≥ 400 CFM. To be considered for this exemption, a remote-mounted fan must be mounted outside the habitable spaces, bathrooms, toilets, and hallways and there shall be ≥ 4 ft. ductwork between the fan and intake grill. Per ASHRAE 62.2-2010, habitable spaces are intended for continual human occupancy; such space generally includes areas used for living, sleeping, dining, and cooking but does not generally include bathrooms, toilets, hallways, storage areas, closets, or utility rooms.
46. Bathroom fans with a rated flow rate ≥ 500 CFM are exempted from the requirement to be ENERGY STAR certified.
47. Ventilation air inlets that are only visible via rooftop access are exempted from Item 7.7 and the Rater shall mark "n/a". The outlet and inlet of balanced ventilation systems shall meet these spacing requirements unless manufacturer instructions indicate that a smaller distance may be used. However, if this occurs the manufacturer's instructions shall be collected for documentation purposes.

48. Without proper maintenance, ventilation air inlet screens often become filled with debris. Therefore, EPA recommends, but does not require, that these ventilation air inlets be located so as to facilitate access and regular service by the building owner.
49. Continuous bathroom local mechanical exhaust fans shall be rated for sound at no less than the airflow rate in Item 8.2. Intermittent bathroom and both intermittent and continuous kitchen local mechanical exhaust fans are recommended, but not required, to be rated for sound at no less than the airflow rate in Items 8.1 and 8.2. Per ASHRAE 62.2-2010, an exhaust system is one or more fans that remove air from the building, causing outdoor air to enter by ventilation inlets or normal leakage paths through the building envelope (e.g., bath exhaust fans, range hoods, clothes dryers). Per ASHRAE 62.2-2010, a bathroom is any room containing a bathtub, shower, spa, or similar source of moisture.
50. An intermittent mechanical exhaust system, where provided, shall be designed to operate as needed by the occupant. Control devices shall not impede occupant control in intermittent systems.
51. Kitchen volume shall be determined by drawing the smallest possible rectangle on the floor plan that encompasses all cabinets, pantries, islands, appliances, and peninsulas and multiplying by the average ceiling height for this area. Cabinet volume shall be included in the kitchen volume.
52. Alternatively, the prescriptive duct sizing requirements in Table 5.3 of ASHRAE 62.2-2010 are permitted to be used for kitchen exhaust fans based upon the rated airflow of the fan at 0.25 IWC. If the rated airflow is unknown, ≥ 6 in. smooth duct shall be used, with a rectangular to round duct transition as needed. Guidance to assist partners with these alternatives is available at energystar.gov/newhomesresources. As an alternative to Item 8.1, dwelling units are permitted to use a continuous kitchen exhaust rate of 25 CFM per 2009 IRC Table M1507.3, if they are either a) PHIUS+ or PHI certified, or b) provide both whole-house ventilation and local mechanical kitchen exhaust using a balanced system, and have a Rater-verified whole-building infiltration rate ≤ 0.05 CFM50 per sq. ft. of Enclosure Area, and a Rater-verified dwelling unit compartmentalization rate ≤ 0.30 CFM50 per sq. ft. of Enclosure Area if multiple dwelling units are present in the building. 'Enclosure Area' is defined as the area of the surfaces that bound the volume being pressurized/depressurized during the test.
53. All intermittent kitchen exhaust fans must be capable of exhausting at least 100 CFM. In addition, if the fan is not part of a vented range hood or appliance-range hood combination (i.e., if the fan is not integrated with the range), then it must also be capable of exhausting ≥ 5 ACH, based on the kitchen volume.
54. Per ASHRAE 62.2-2010, ducted mechanical systems are those that supply air to an occupiable space through ductwork exceeding 10 ft. in length and through a thermal conditioning component, except for evaporative coolers. Systems that do not meet this definition are exempt from this requirement. Also, mini-split systems typically do not have MERV-rated filters available for use and are, therefore, also exempted under this version of the requirements. HVAC filters located in the attic shall be considered accessible to the occupant or building owner if drop-down stairs provide access to attic and a permanently installed walkway has been provided between the attic access location and the filter.
55. The filter media box (i.e., the component in the HVAC system that houses the filter) may be either site-fabricated by the installer or pre-fabricated by the manufacturer to meet this requirement. These requirements only apply when the filter is installed in a filter media box located in the HVAC system, not when the filter is installed flush with the return grill.
56. The pressure boundary is the primary enclosure boundary separating indoor and outdoor air. For example, a volume that has more leakage to outside than to conditioned space would be outside the pressure boundary.
57. Per the 2009 International Mechanical Code, a direct-vent furnace or boiler is one that is constructed and installed so that all air for combustion is derived from the outdoor atmosphere and all flue gases are discharged to the outside atmosphere; a mechanical draft system is a venting system designed to remove flue or vent gases by mechanical means consisting of an induced draft portion under non-positive static pressure or a forced draft portion under positive static pressure; and a natural draft system is a venting system designed to remove flue or vent gases under nonpositive static vent pressure entirely by natural draft.
58. Naturally drafted equipment is only allowed if located in a space outside the pressure boundary, where the envelope assemblies separating it from conditioned space are insulated and air-sealed.
59. Where water heater efficiency is rated in Uniform Energy Factor (UEF) rather than Energy Factor (EF), the EF may be calculated from the Uniform Energy Factor (UEF) using the RESNET EF Calculator 2017. The calculated EF must meet the efficiency levels specified in the ENERGY STAR MF Reference Design.
60. In accordance with Section 7.4.3 of ASHRAE 90.1-2016, the following DHW piping requires insulation:
    a. Recirculating system piping, including the supply and return piping of a circulating tank type water heater.
    b. The first 8 feet of outlet piping of a constant-temperature nonrecirculating storage system.
    c. The first 8 feet of branch piping connecting to recirculated, heat-traced, or impedance heated piping.
    d. The inlet piping between the storage tank and a heat trap in a nonrecirculating storage system.
    e. Piping that is externally heated (such as heat trace or impedance heating.
61. Senior housing projects can use allowances for 'facilities for the visually impaired' in ASHRAE 90.1-2016 Appendix G Table G3.7 for spaces used primarily by building residents. For example, 1.15 W/SF lighting power allowance may be used for the corridors in the baseline. To qualify for the increased allowance, the project must be designed to comply with the light levels in ANSI/IES RP-28 and must provide housing for seniors and/or people with special visual needs. Prescriptive Path dwelling unit overall in-unit lighting power density is permitted to be ≤ 1.3 W/SF, using 1.65 W/SF where lighting is not installed.
62. As an alternative to ENERGY STAR certification, lighting fixtures are permitted to meet the ANSI 301 definition for qualifying Tier I lighting.
63. Where an appliance type is not eligible for ENERGY STAR certification, (e.g., commercial dryers) the appliance is exempt from this requirement.
64. As an alternative, projects may submit to EPA for approval their strategy for collecting annual building-level data, such as an agreement with the utility companies to provide the aggregated building-level data or evidence that securing signed utility data release forms will be a mandatory component of all lease agreements.

Exhibit X – Prescriptive Minimum Heating and Cooling Equipment Efficiencies

Equipment Type	Minimum Efficiency
Room AC (window, through-wall, ductless mini-splits)	ENERGY STAR certified
Air conditioners, air cooled (<13 KBtu/h)	13 SEER
Air conditioners, air cooled (≥13 and <65 KBtu/h)	See Reference Design
Air conditioners, air cooled (≥65 and <240 KBtu/h)	11.5 EER/12.0 IEER
Air conditioners, air cooled (≥240 and < 760 KBtu/h)	10.0 EER/10.5 IEER
Electric resistance space heating	• Not permitted in any dwelling unit using the Prescriptive Path • Electric resistance heating specified in common spaces has a total heating capacity ≤ 12 kBtu/h (3.5 kW) per enclosed space and has automatic thermostatic controls
Warm-Air Furnace (<225 KBtu/h, common spaces)	78% AFUE or 80% Et
Warm-Air Furnace (<225 KBtu/h, dwelling units)	See Reference Design
Warm-Air Furnace (≥225 KBtu/h)	80% Et (gas) or 81% Et (oil)
Packaged Terminal Air Conditioner (PTAC)	13.8 – (0.300 X Cap/1000) EER
Packaged Terminal Heat Pump (PTHP)	Cooling: 14.0– (0.3 X Cap/1000) EER Heating: 3.7– (0.052 X Cap/1000) COP
Air cooled heat pump (≥13 and <65 KBtu/h)	See Reference Design
Air cooled heat pump (≥65 and <240 KBtu/h)	Cooling: 11.1 EER/11.6 IEER Heating: 3.3 COP (@47°F DB)
Air cooled heat pump (≥240 KBtu/h)	Cooling: 9.6 EER/9.6 IEER Heating: 3.2 COP (@47°F DB)
Water-source heat pump (<135 KBtu/h)	Cooling: 14.0 EER(86°F entering water) Heating: 4.2 COP(68°F entering water)
Boilers, hot water (<300,000 Btu/h)	See Reference Design
Boilers, hot water (≥300,000 Btu/h)	86% E_t (89% E_t if using heat pumps)
VRF Air Conditioners and Heat Pumps	See Tables 6.8.1I and 6.8.1J of ASHRAE 90.1-2010
Air-cooled chillers with or without condenser	10.0 EER / 12.5 IPLV
Water-cooled chiller, positive displacement (<75 tons)	0.780 kW/ton (Full load) / 0.630 kW/ton (IPLV)
Water-cooled chiller, positive displacement (75-150 tons)	0.775 kW/ton (Full load) / 0.615 kW/ton (IPLV)
Water-cooled chiller, positive displacement (150-300tons)	0.680 kW/ton (Full load) / 0.580 kW/ton (IPLV)
Water-cooled chiller, positive displacement (>300 tons)	0.620 kW/ton (Full load) / 0.540 kW/ton (IPLV)
Water-cooled, centrifugal (<300 tons)	0.634 kW/ton (Full load) / 0.596 kW/ton (IPLV)
Water-cooled, centrifugal (≥300 and <600 tons)	0.576 kW/ton (Full load) / 0.549 kW/ton (IPLV)
Water-cooled, centrifugal (≥600 tons)	0.570 kW/ton (Full load) / 0.539 kW/ton (IPLV)
Air-cooled absorption single effect chiller	0.6 COP
Water-cooled absorption single effect chiller	0.7 COP
Absorption double effect indirect-fired chiller	1.0 COP (Full load) / 1.05 COP (IPLV)
Absorption double effect direct-fired chiller	1.0 COP (Full load) / 1.00 COP (IPLV)
Open-loop propeller or axial fan cooling towers*	>40 gpm/hp (@95°F entering water, 85°F leaving water, 75°F wb entering air)
Closed-loop propeller or axial fan cooling towers*	>15 gpm/hp (@102°F entering water, 90°F leaving water, 75°F wb entering air)
Open-loop centrifugal fan cooling towers*	>22 gpm/hp (@95°F entering water, 85°F leaving water, 75°F wb entering air)
Closed-loop centrifugal fan cooling towers*	>8 gpm/hp (@102°F entering water, 90°F leaving water, 75°F wb entering air)

Cap means the rated capacity of the product in Btu/h. If < 7,000 Btu/h, use 7,000; if > 15,000, use 15,000 in calculation.

*Cooling tower fan motors must be equipped with VFD controlled by a temperature sensor on the condenser water supply pipe.