

ENERGY STAR[®]

Residential New Construction Programs

Historical Document

This document is provided for reference because it has been superseded by a more recent Version or Revision.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

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

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



Oregon and Washington ERI Target Procedure

ENERGY STAR Multifamily New Construction, Version 1.2

This document provides detailed instructions for determining the ENERGY STAR ERI Target, the highest ERI value that each rated multifamily unit may achieve to earn the ENERGY STAR. Note that, in addition to meeting the ENERGY STAR ERI Target for each unit, units shall also meet all Mandatory Requirements for All Multifamily New Construction Projects in Exhibit 2 of the National Program Requirements for ENERGY STAR Multifamily New Construction, Version 1 / 1.1 / OR-WA 1.2.

A software rating tool approved by an EPA-Approved Verification Oversight Organization shall automatically determine (i.e., without relying on a user-configured ENERGY STAR Multifamily Reference Design) this target for each rated unit. This shall be done by configuring the ENERGY STAR Multifamily Reference Design in accordance with Exhibit 1, the Expanded ENERGY STAR Multifamily Reference Design Definition, and calculating its associated ERI value. This value, rounded to the nearest whole number, shall equal the ENERGY STAR ERI Target.



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ENERGY STAR Multifamily New Construction, Version 1.2

Exhibit 1: Expanded ENERGY STAR Multifamily Reference Design Definition

Building Component	Expanded ENERGY STAR Multifamily Reference Design Definition ¹			
Foundations:	Construction Type & Structural Mass: Same as Rated Unit ² , except:			
	<ul style="list-style-type: none"> For masonry floor slabs, modeled with 80% of floor area covered by carpet and 20% of floor directly exposed to room air 			
	Conditioning Type: Same as Rated Unit ² , except:			
	<ul style="list-style-type: none"> Crawlspaces shall be modeled as vented with net free vent aperture = 1sq. ft. per 150 sq. ft. of crawlspace floor area 			
	Gross Area: Same as Rated Unit ²			
Floors Over Unconditioned Spaces:	Insulation: ^{3,4} Choose appropriate insulation level below;			
	<ul style="list-style-type: none"> Basement Wall Continuous Insulation R-Value only applies to conditioned basements; if applicable, insulation shall be located on interior side of walls Floor assemblies above crawlspace foundations shall be configured to meet the applicable floor assembly U-factor listed in the building component section for Floors Over Unconditioned Spaces On-grade and below-grade slab floors shall be insulated to the Slab Insulation R-value at both the perimeter for the entire depth of the slab, or 2 ft. if slab depth is not specified by user, and under the entire slab area 			
	Climate Zone:	CZ 4 C & 5	CZ 6	
	Slab Insulation R-Value:	10	10	
	Basement Wall Continuous Insulation R-Value:	15	15	
Above-Grade Walls:	Construction Type: Wood frame			
	Gross Area: Same as Rated Unit ²			
	Insulation: ^{3,4}			
	Climate Zone:	CZ 4 C & 5	CZ 6	
	Floor Assembly U-Factor:	0.028	0.028	
Thermally Isolated Sunrooms:	Interior and Exterior Construction Type: Wood frame			
	Gross Area: Same as Rated Unit ²			
	Solar Absorptance = 0.75			
	Emittance = 0.90			
	Insulation: ³			
Doors:	Climate Zone:			
	Wall Assembly U-Factor:			
	0.056			
	0.056			
	None			
Glazing:	Area: Same as Rated Unit ²			
	Orientation: Same as Rated Unit ²			
	U-Factors and SHGCs, based on ENERGY STAR doors: ⁵			
	Door Type:	Opaque	≤ 1/2-Lite	> 1/2-Lite
	U-Factor:	0.17	0.25	0.30
SHGC:	n/a	0.25	0.30	
Skylights:	Total Area: AG = 0.15 x CFA x FA x F, without exceeding available wall area ⁶			
	Orientation: Same as Rated Unit ² , by percentage of area			
	Interior Shade Coefficient: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301 ⁷			
	External Shading: None			
	Assembly U-Factors and SHGCs: ⁵			
	Climate Zone:	CZ 4 C & 5	CZ 6	
	U-Factor:	0.27	0.27	
	SHGC:	0.30	0.30	
	Class AW Assembly U-Factors (i.e., Structural) Windows based on 2015 IgCC			
	Climate Zone:	CZ 4 C & 5	CZ 6	
Fixed Window U-Factor:	0.36	0.34		
Operable Window U-Factor:	0.43	0.41		
SHGC:	0.30	0.30		
Ceilings:	None			
	Construction Type: Wood frame			
	Gross Area: Same as Rated Unit ²			
	Insulation: ³			
	Climate Zone:	CZ 4 C & 5	CZ 6	
Roofs:	Ceiling Assembly U-Factor:			
	0.026			
	0.026			
	Construction Type: Vented with aperture = 1sq. ft. per 300 sq. ft. ceiling area			
	Radiant Barrier: None			
Attics:	Construction Type: Composition shingle on wood sheathing			
	Gross Area: Same as Rated Unit ²			
	Solar Absorptance = 0.92			
	Emittance = 0.90			



Oregon and Washington ERI Target Procedure

ENERGY STAR Multifamily New Construction, Version 1.2

Exhibit 1: Expanded ENERGY STAR Multifamily Reference Design Definition (Continued)

Heating Systems:	Heating capacity shall be selected in accordance with ACCA Manual S based on building heating and cooling loads calculated in accordance with ACCA Manual J, Eighth Edition, ASHRAE Handbook of Fundamentals, or an equivalent computation procedure		
	Fuel Type: Same as Rated Unit ^{2, 8}		
	System Type: Same as Rated Unit ² , except Reference Design shall be configured with air-source heat pump where Rated Unit is modeled with ground-source heat pump, electric strip or baseboard heat; applicable efficiency selected from below ⁹		
	Climate Zone:	CZ 4 C & 5	CZ 6
	Gas Furn. AFUE:	95	95
	Oil Furn. AFUE:	85	85
Gas Boiler AFUE:	90	90	
Oil Boiler AFUE:	86	86	
Air-Source Heat Pump HSPF:	9.5	9.5	
Air-Source Heat Pump Backup:	Electric	Electric	
Ground-Source Heat Pump COP:	n/a	n/a	
For non-electric warm furnaces and non-electric boilers, the Electric Auxiliary Energy shall be determined in accordance with the methodology for the Energy Rating Reference Home in ANSI / RESNET / ICC Std. 301, using the capacity determined in this Section			
Cooling Systems:	Cooling capacity shall be selected in accordance with ACCA Manual S based on building heating and cooling loads calculated in accordance with ACCA Manual J, Eighth Edition, ASHRAE Handbook of Fundamentals, or an equivalent computation procedure		
	Fuel Type: Same as Rated Unit ^{2, 8}		
	System Type: Same as Rated Unit ² , except Reference Design shall be configured with air-source heat pump where Rated Unit is modeled with ground-source heat pump; applicable efficiency selected from below ¹⁰		
	Climate Zone:	CZ 4 C & 5	CZ 6
	AC SEER:	13	13
	Air-Source Heat Pump SEER:	15	15
Ground-Source Heat Pump EER:	n/a	n/a	
Service Water Heating Systems:	Use (Gallons per Day): Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301, except for reduced usage resulting from R-3 pipe insulation and the equipment specified in the Lighting, Appliances, Fixtures & Internal Gains Section ^{7, 11}		
	Tank Temperature: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301 ⁷		
	Recirculation Pump: 0 kWh per year		
	Fuel Type & System Type: If Rated Unit uses a system with a gas or propane fuel type, model as instantaneous gas water heater. If Rated Unit uses a system with an oil, electric, or other fuel type, model as 60 gallon electric heat pump water heater. Select applicable efficiency from below ⁸		
	Climate Zone:	CZ 4 C & 5	CZ 6
	Gas DHW EF:	0.91 EF	0.91 EF
Electric DHW EF:	2.5 EF	2.0 EF	
Thermal Distribution Systems:	Duct Leakage to Outside: The greater of 4 CFM25 per 100 sq. ft. of conditioned floor area or 40 CFM25		
	Duct Insulation: R-8 on all ducts located in unconditioned space		
	Duct Surface Area: Same as Rated Unit ²		
	Supply and Return Duct Locations shall be configured according to the table below		
	Ceiling Type:	Adiabatic	All Other
	One Story Unit:	100% Conditioned	100% Attic
All other Units:	100% Conditioned	75% Attic / 25% Conditioned	
Thermostat:	Type: Programmable		
	Temperature Setpoints: Same as Energy Rating Reference Home, but with offsets for a programmable thermostat, as defined by ANSI / RESNET / ICC Std. 301 ⁷		
Infiltration & Mechanical Ventilation:	Compartmentalization Rates:		
	Climate Zone:	CZ 4 C & 5	CZ 6
	cfm50/ft² Enclosure Area ¹²	0.30	0.30
	Mechanical ventilation system without heat recovery		
	Rate: CFM = 0.01 * CFA + 7.5 * (Nbr + 1), where CFA = Conditioned Floor Area and Nbr = Number of Bedrooms; Runtime: 24 Hours / Day		
	Fan Watts: Watts = CFM Rate / 2.8 CFM per Watt, where CFM Rate is determined above		
Climate Zone:	CZ 4 C & 5	CZ 6	
Ventilation Type:	Exhaust	Exhaust	



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Exhibit 1: Expanded ENERGY STAR Multifamily Reference Design Definition (Continued)

Lighting, Appliances, Fixtures & Internal Gains:	Lighting: Fraction of qualifying Tier I fixtures to all fixtures in qualifying light fixture locations 90% for interior; 0% for exterior and garage						
	Refrigerator: 423 kWh per year						
	Dishwasher: 0.66 EF, Place Setting Capacity Same as Rated Unit ² ; use 12 settings if no dishwasher installed in Rated Unit						
	Clothes Washer: Use the ENERGY STAR values below, even if no clothes washer is installed. Exception: If installed clothes washer is not available as ENERGY STAR certified (e.g., top-loading commercial clothes washers, Combination All-In One Washer-Dryers), model the same as the Rated Unit clothes washer						
		LER	\$/kWh	AGC	\$/therm	CAPw	IMEF
	ENERGY STAR	152	0.12	12	1.09	4.2	2.06
	Clothes Dryer: Field Use Factor is 1.04 and CEF is 3.93 for electric and 3.43 for gas, even if no clothes dryer is installed. Exception: If installed clothes dryer is not available as ENERGY STAR certified (e.g., commercial clothes dryers, Combination All-In One Washer-Dryers), model the same as the Rated Unit clothes dryer						
	Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Unit; otherwise Quantity = 0						
	Water fixtures: all showers and faucets ≤ 2.0 gpm						
	Internal Gains: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301, except for adjustments for the lighting, refrigerator, dishwasher, clothes washer, clothes dryer, and ceiling fans specified in this section ⁷						
Internal Mass:	Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301 ⁷						
	Additional mass specifically designed as a Thermal Storage Element for the Rated Unit shall be excluded						



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Footnotes:

1. Any parameter not specified in this exhibit shall be identical to the value entered for the Rated Unit. Where envelope building components do not exist in the Rated Unit, such as a foundation or slab, they should not be modeled in the ENERGY STAR Multifamily Reference Design. Where the envelope component is adiabatic in the Rated Unit, it shall also be adiabatic in the Multifamily Reference Design.
2. "Same as Rated Unit" indicates that the parameter shall be identical to the value entered for the Rated Unit.
3. Slab insulation R-values represent nominal insulation levels; and assembly U-factors for foundations, floors, walls, and ceilings represent the overall assembly, inclusive of sheathing materials, cavity insulation, installation quality, framing, and interior finishes.
4. If software allows the user to specify the thermal boundary location independent of the conditioned space boundary in the basement of the Rated Unit, then the thermal boundary of the ENERGY STAR Multifamily Reference Design shall be aligned with this boundary. For example, if the thermal boundary is located at the walls, then the wall insulation shall be configured as if it was a conditioned basement. If the thermal boundary is located at the floor above the basement, then the floor insulation shall be configured as if it was a floor over an unconditioned space.
5. Note that the U-factor requirement applies to all fenestration while the SHGC only applies to the glazed portion.
6. When determining the ENERGY STAR ERI Target, the following formula shall be used to determine total window area of the ENERGY STAR Multifamily Reference Design:

$$AG = 0.15 \times CFA \times FA \times F$$

Where:

- AG = Total glazing area
- CFA = Total conditioned floor area
- FA = (Gross above-grade thermal boundary wall area) / (Gross above-grade boundary wall area + 0.5 x Gross below-grade thermal boundary wall area)
- F = 1 - 0.44 x (Gross common wall area) / (Gross above-grade thermal boundary wall area + Gross common wall area)

And where:

- Thermal boundary wall is any wall that separates conditioned space from unconditioned space, outdoor environment, or the surrounding soil;
 - Above-grade thermal boundary wall is any portion of a thermal boundary wall not in contact with soil;
 - Below-grade boundary wall is any portion of a thermal boundary wall in soil contact; AND
 - Common wall is the total wall area of walls adjacent to other conditioned space, not including foundation walls.
7. The version of ANSI / RESNET / ICC Std. 301 utilized by RESNET for HERS ratings shall be used to configure this parameter.
 8. Fuel type(s) shall be same as Rated Unit, including any dual-fuel equipment where applicable. For a Rated Unit with multiple heating, cooling, or water heating systems using different fuel types, the applicable system capacities and fuel types shall be weighted in accordance with the loads distribution (as calculated by accepted engineering practice for that equipment and fuel type) of the multiple systems.
 9. For a Rated Unit without a heating system, the ENERGY STAR Multifamily Reference Design shall be configured with a 78% AFUE gas furnace system, unless the Rated Unit has no access to natural gas or fossil fuel delivery. In such cases, the ENERGY STAR Reference Multifamily Design shall be configured with a 7.7 HSPF air-source heat pump.
 10. For a Rated Unit without a cooling system, the ENERGY STAR Multifamily Reference Design shall be configured with a 13 SEER electric air conditioner.
 11. That is to say, representative of standard-flow plumbing fixtures, reference clothes washer gallons per day, standard distribution system water use effectiveness, a hot water piping ratio of 1.0, no pipe insulation, and no drain water heater recovery.
 12. For a Rated Unit with conditioned space below, that does not indirectly use corridor air as the ventilation supply air, the ENERGY STAR Multifamily Reference Design shall be configured with an infiltration rate of 0.255 cfm50/ft² and software shall either automatically apply a 15% reduction to the compartmentalization results of the Rated Unit or instruct the Rater to apply the reduction. If automatically applied, the software shall make that known, such that the Rater does not also apply the same reduction, which is based on the *RESNET Guidelines for Multifamily Energy Ratings*.