DRAFT National ERI Target Procedure (ANSI 301-2019)

ENERGY STAR Multifamily New Construction, Version 1.2 (Rev. 02)

National ERI Target Procedure for use with ANSI/RESNET/ICC 301-2019

This document provides detailed instructions for determining the ENERGY STAR ERI Target, the highest ERI value that each rated multifamily unit, excluding townhouses, 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 / 1.2 While Townhouses are eligible to earn ENERGY STAR Multifamily New Construction certification by meeting their ENERGY STAR ERI Target and also meeting all Mandatory Requirements for All Multifamily New Construction Projects in Exhibit 2 of the National Program Requirements, the instructions for determining their ENERGY STAR ERI Target is in the National ERI Target Procedure for ENERGY STAR Single-Family New Homes.

An EPA-recognized Home Certification Organization's (HCO) Approved Software Rating Tool 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. The ERI value shall be calculated using ANSI / RESNET / ICC Standard 301-2019 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the implementation schedule defined by the HCO that the building is being certified under. RESNET interpretations of Standard 301-2019 shall also be followed. Any exceptions shall be approved by EPA and reported at www.energystar.gov/ERIExceptions. This value, rounded to the nearest whole number, shall equal the ENERGY STAR ERI Target.

The National ERI Target Procedure (ANSI 301-2014) must instead be used to determine the ENERGY STAR ERI Target when using ANSI / RESNET / ICC Standard 301-2014.

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: • 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: • 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]							
	Insulation: [3, 4] Choose appropriate insulation level below; • 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 and crawlspace walls shall be uninsulated • Slab floors with a floor surface less than 24" below grade shall be insulated to the Slab Insulation R-value. The insulation shall extend downward from the top of the slab on the outside of the foundation wall and then vertically below-grade to the Slab Insulation Depth [5]							
	Climate Zone: [5]	**CZ 1**	**CZ 2**	**CZ 3**	**CZ 4**	**CZ 4 C & 5**	**CZ 6**	**CZ 7**	**CZ 8**
	Slab Insulation R-Value:	0	0	10	10	10	10	10	10
	Slab Insulation Depth (ft):	0	0	2	4	4	4	4	4
	Basement Wall Assembly U-Factor:	0.360	0.360	0.091	0.059	0.050	0.050	0.050	0.050
Floors Over Unconditioned Space Volumes, Non-Freezing Space or outdoor environment:	Construction Type: Wood frame							
	Gross Area: Same as Rated Unit [2]							
	Insulation: [3, 4]							
	Climate Zone: [5]	**CZ 1**	**CZ 2**	**CZ 3**	**CZ 4**	**CZ 4 C & 5**	**CZ 6**	**CZ 7**	**CZ 8**
	Floor Assembly U-Factor:	0.064	0.064	0.047	0.047	0.033	0.033	0.028	0.028
Above-Grade Walls, adjacent to Exterior or Garage:	Interior and Exterior Construction Type: Wood frame							
	Gross Area: Same as Rated Unit [2]							
	Solar Absorptance = 0.75							
	Emittance = 0.90							
	Insulation: [1, 3]							
	Climate Zone: [5]	**CZ 1**	**CZ 2**	**CZ 3**	**CZ 4**	**CZ 4 C & 5**	**CZ 6**	**CZ 7**	**CZ 8**
	Wall Assembly U-Factor:	0.084	0.084	0.060	0.045	0.045	0.045	0.045	0.045
Thermally Isolated Sunrooms:	None								
Doors: [5]	Area: Same as Rated Unit [2], with door seal properly installed to minimize air leakage between the door and door frame, to avoid the 140 CFM50 addition to measured airflow per ANSI / RESNET / ICC Std. 380							
	Orientation: Same as Rated Unit [2]							
	Door Type:	**Opaque**		**≤ 1/2-Lite**		**> 1/2-Lite CZ 1-3**		**> 1/2-Lite CZ 4-8**
	U-Factor:	0.17		0.25		0.30		0.30
	SHGC:	n/a		0.25		0.25		0.40
Glazing: [5]	Total Area: AG = 0.15 x CFA x FA x F, without exceeding available wall area [8]							
	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							
	External Shading: None							
	Climate Zone: [5]	**CZ 1**	**CZ 2**	**CZ 3**	**CZ 4**	**CZ 4 C & 5**	**CZ 6**	**CZ 7**	**CZ 8**
	U-Factor:	0.40	0.40	0.30	0.30	0.27	0.27	0.27	0.27
	SHGC:	0.25	0.25	0.25	0.40	0.40	0.40	0.40	0.40
	Class AW Assembly U-Factors (i.e., Structural) Windows based on 2021 IgCC								
	Climate Zone: [5]	**CZ 1**	**CZ 2**	**CZ 3**	**CZ 4**	**CZ 4 C & 5**	**CZ 6**	**CZ 7**	**CZ 8**
	Fixed Window U-Factor:	0.48	0.43	0.40	0.34	0.34	0.32	0.28	0.27
	Operable Window U-Factor:	0.59	0.57	0.51	0.43	0.43	0.40	0.34	0.30
	SHGC:	0.25	0.25	0.25	0.40	0.40	0.40	0.40	0.40
Skylights:	None								
Ceilings, adjacent to Exterior or Unconditioned Space Volumes:	Construction Type: Wood frame								
	Gross Area: Same as Rated Unit [2]								
	Insulation: [1, 3]								
	Climate Zone: [5]	**CZ 1**	**CZ 2**	**CZ 3**	**CZ 4**	**CZ 4 C & 5**	**CZ 6**	**CZ 7**	**CZ 8**
	Ceiling Assembly U-Factor:	0.035	0.026	0.024	0.024	0.024	0.024	0.024	0.024
Attics:	Construction Type: Vented with aperture = 1sq. ft. per 300 sq. ft. ceiling area [1, 9]								
	Radiant Barrier: None								
Roofs:	Construction Type: Composition shingle on wood sheathing								
	Gross Area: Same as Rated Unit [2]								
	Solar Absorptance = 0.92								
	Emittance = 0.90								

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

Internal Mass:

Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301

Additional mass specifically designed as a Thermal Storage Element for the Rated Unit shall be excluded

Lighting, Appliances, Fixtures & Internal Gains:

Lighting: Fraction of qualifying Tier I fixtures to all fixtures in qualifying light fixture locations 100% for interior; 100% for exterior and garage

Refrigerator: 450 kWh per year

Dishwasher: Capacity: Same as Rated Unit [2], or Standard capacity if no dishwasher installed in Rated Unit
For Standard capacity: LER = 270, GHWC = $22.23, Elec$ = $0.12, Gas$ = $1.09, LCY = 208
For Compact capacity: LER = 203, GHWC = $14.20, Elec$ = $0.12, Gas$ = $1.09, LCY = 208

Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Unit; otherwise, Quantity = 0

Clothes Washer: If clothes washer present in the Rated Unit, efficiency equal to "Std 2018-Present" Standard Clothes Washer Model; otherwise same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301
Clothes Dryer: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301

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, and ceiling fans specified in this section

Heating Systems:

Heating capacity shall be selected in accordance with ACCA Manual S based on loads calculated for the Reference Design in accordance with ACCA Manual J, Eighth Edition, ASHRAE Handbook of Fundamentals, or an equivalent computation procedure. For forced-air HVAC systems, degraded capacity from other-than-Grade I installation shall be accounted for using same methodology applied to Energy Rating Reference Home. Where heat from a central boiler is distributed by water-loop heat pumps within the Rated Unit, in accordance with the methodology for the Rated Home in ANSI / RESNET / ICC Std. 301, the Reference Design shall be configured such that the heating load is assigned to two separate heating systems: 1) a heat pump with a capacity that is equal to the Reference Design heating load divided by 4.5 COP and 2) a boiler with the balance of the capacity of (1-1/4.5) or 77.78%

Fuel Type: Same as Rated Unit, except Reference Design shall be configured with gas where Rated Unit has non-electric equipment [2, 8]

Installation Quality: For forced-air HVAC systems, Grade II -20% blower fan airflow deviation, Grade II 0.52 W / CFM blower fan efficiency, and for air-source heat pumps, Grade III refrigerant undercharge

System Type: Same as Rated Unit [2], except Reference Design shall be configured with air-source heat pump where Rated Unit has electric strip heat or electric baseboard heat; efficiency selected from below [11]

Climate Zone: [5]	**CZ 1**	**CZ 2**	**CZ 3**	**CZ 4**	**CZ 4C & 5**	**CZ 6**	**CZ 7**	**CZ 8**
Gas Furnace AFUE:	80	80	80	90	95	95	95	95
Gas Boiler AFUE:	80	80	80	90	95	95	95	95
Central Boiler, ≥ 300 KBtu/h E_t:	80	80	80	86	95	95	95	95
Central Boiler w/WLHP, ≥ 300 KBtu/h E_t:	80	80	80	89	90	90	90	90
Air-Source Heat Pump HSPF:	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
Air-Source Heat Pump Backup:	Electric	Electric	Electric	Electric	Electric	Electric	Electric	Electric
Ground-Source Heat Pump COP:	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7

For non-electric warm air furnaces and non-electric boilers, serving the Rated Unit and no other units, the Electric Auxiliary Energy shall be determined in accordance with the methodology for the Energy Rating Reference Home in ANSI / RESNET / ICC Std. 301. For non-electric boilers and GSHPs, serving the Rated Unit and other units through a shared circulation loop, the Electric Auxiliary Energy shall be determined in accordance with the methodology for the Rated Home in ANSI / RESNET / ICC Std. 301, using the same Shared Pump Power (SP_{kW}) OR using 0.85 for motor efficiency and using the same HP as the pump serving the Rated Unit

Cooling Systems:

Cooling capacity shall be selected in accordance with ACCA Manual S based on loads calculated for the Reference Design in accordance with ACCA Manual J, Eighth Edition, ASHRAE Handbook of Fundamentals, or an equivalent computation procedure. For forced-air HVAC systems, degraded capacity from Grade III install shall be accounted for using same methodology applied to Energy Rating Reference Home

Fuel Type: Same as Rated Unit, except Reference Design shall be configured with gas where Rated Unit has non-electric equipment [2, 10]

Installation Quality: For forced-air HVAC systems, Grade II -20% blower fan airflow deviation, Grade II 0.52 W / CFM blower fan efficiency and, for AC's & air-source heat pumps, Grade III refrigerant undercharge

System Type: Same as Rated Unit [2], except Reference Design shall be configured with air-source heat pump where Rated Unit has electric strip heat, or electric baseboard heat; applicable efficiency selected from below [10]

Climate Zone:	**CZ 1**	**CZ 2**	**CZ 3**	**CZ 4**	**CZ 4 C & 5**	**CZ 6**	**CZ 7**	**CZ 8**
AC SEER:	16	16	16	16	14	14	14	14
Air-Source Heat Pump SEER:	16	16	16	16	16	16	16	16
Ground-Source Heat Pump EER:	14	14	14	14	14	14	14	14

Where system type is a chiller or cooling tower with water-loop heat pumps, Reference Design $SEER_{eq}$ shall be determined in accordance with the methodology for the Rated Home in ANSI / RESNET / ICC Std. 301, using the same pumping and fan power OR using 0.85 for motor efficiency and using the same HP as the pumps and fans serving the Rated Unit. For chillers, Reference Design $SEER_{eq}$ shall be determined using 0.75 kW/ton. For water-loop heat pumps, Reference Design $SEER_{eq}$ shall be determined using 15 EER

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 the dishwasher, low-flow fixtures, and clothes washer as specified in the Lighting, Appliances, Fixtures & Internal Gains Section[11]

Tank Temperature: Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301

Recirculation Pump Energy (for pumps serving the Rated Unit and no other units): 0 kWh per year
Recirculation Pump Energy (for pumps serving the Rated Unit and other units): as defined by ANSI / RESNET / ICC Std. 301, using the same Shared HW Pump Power ($SHWP_{kW}$) OR using 0.85 for motor efficiency and using the same HP as the pump serving the Rated Unit

Fuel Type: Same as Rated Unit except Reference Design shall be configured with gas where Rater Unite has non-electric equipment [2, 10]

System Type (when Rated Unit is served by a commercial system): Same as system serving the Rated Unit. For fossil-fuel boilers or water heaters, use 90% E_t. For electric boilers or water heaters, use 1.2 COP
System Type (when Rated Unit is served by residential systems): Where Rater Unit has non-electric water heater. Reference Design shall be configured with a tankless gas water heater with 0.90 UEF. Where Rater Unit has electric water heater, Reference Design shall be configured with an electric heat pump water heater with 1.49 UEF and tank size equal to that of Rated Unit, or 60 gallon tank size if Rated Unit uses tankless electric water heater.

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

Thermal Distribution Systems:	Duct Leakage to Outside: 0 CFM25 per 100 sq. ft. of conditioned floor area							
	Duct Insulation: None							
	Duct Surface Area: Same as Rated Unit [2]							
	Supply and Return Duct Locations shall be 100% in conditioned space							
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							
Infiltration & Mechanical Ventilation:	Compartmentalization Rates: 0.3 cfm50/ft2 Enclosure Area, with Aext applied to calculate Infiltration Rate, in accordance with ANSI / RESNET / ICC Std. 301							
	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: [5]	**CZ 1**	**CZ 2**	**CZ 3**	**CZ 4**	**CZ 4 C & 5**	**CZ 6**	**CZ 7**	**CZ 8**
	Ventilation Type:	Supply	Supply	Supply	Supply	Exhaust	Exhaust	Exhaust	Exhaust

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, unless explicitly stated, such as vented attics where unvented attics are present in the Rated Unit. Where the envelope component is adiabatic in the Rated Unit, it shall also be adiabatic in the Multifamily Reference Design. Where the envelope component is not adiabatic but is adjacent to a space other than those specified in the Building Component column of Exhibit 1, model as uninsulated in the 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, for the purposes of the ENERGY STAR Reference Design, the slab insulation R-value and depth shall be modeled even in jurisdictions designated by a code official as having Very Heavy Termite Infestation for the purpose of determining the ENERGY STAR ERI Target. This is in contrast to the total UA limit in support of Item 3.1 of the National Rater Design Review Checklist, which when calculated at a unit level shall be calculated by replacing the code-required slab insulation R-value and depth with the slab insulation R-value and depth specified in the Rated Unit for such jurisdictions.
6. 2021 IECC Climate Zone designations, as defined and illustrated in Section R301 of the code, shall be used to configure the ENERGY STAR Reference Design. Note that some locations have shifted to a different Climate Zone in the 2021 IECC compared to prior editions.
7. Note that the U-factor requirement applies to all fenestration while the SHGC only applies to the glazed portion.
8. 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.
9. A vented unconditioned attic shall only be modeled in the Multifamily Reference Design where attics (of any type) exist in the Rated Unit or when specified as the Duct Location in the Thermal Distribution Systems section of this Exhibit. Where the Rated Unit has more than one ceiling type, the ceiling area used to calculate the vent aperture area shall be the area of the ceiling that is exposed to exterior, under attics, and/or under other unconditioned common spaces. Where the Rated Unit is entirely located beneath another dwelling unit or unrated conditioned space, no attic is modeled in the Reference Design.
10. 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, unless otherwise specified by ANSI / RESNET / ICC Std. 301.
11. 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.
12. For a Rated Unit without a cooling system, the ENERGY STAR Multifamily Reference Design shall be configured with a 13 SEER electric air conditioner.
13. That is to say, representative of low-flow plumbing fixtures, reference or "Std-Present" Standard Clothes Washer Model 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.