National ERI Target Procedure (ANSI 301-20194)

ENERGY STAR Multifamily New Construction, Version 1.1 (Rev. 01).

National ERI Target Procedure for use with ANSI/RESNET/ICC 301-20194

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 / OR-WA 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 Certified Homes.

An EPA-recognized Verification Oversight Organization's 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 301-20194 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the Effective Date and Transition Period End Date defined by RESNET. RESNET interpretations of Standard 301-20194 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 301-20149) must instead be used to determine the ENERGY STAR ERI Target when using ANSI / RESNET / ICC Standard 301-20149.

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 • 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
	Climate Zone: CZ 1 | CZ 2 | CZ 3 | CZ 4 | CZ 4 C & 5 | CZ 6 | CZ 7 | CZ 8 **Slab Insulation R-Value:** 0 | 0 | 0 | 10 | 10 | 15 | 15 | 20 **Slab Insulation Depth (ft):** 0 | 0 | 0 | 2 | 2 | 2 | 2 | 2 **Basement Wall Continuous Insulation R-Value:** 0 | 0 | 0 | 7.5 | 7.5 | 7.5 | 10 | 12.5
Floors Over Unconditioned Spaces:	Construction Type: Wood frame
	Gross Area: Same as Rated Unit [2]
	Insulation: [3, 4]
	Climate Zone: CZ 1 | CZ 2 | CZ 3 | CZ 4 | CZ 4 C & 5 | CZ 6 | CZ 7 | CZ 8 **Floor Assembly U-Factor:** 0.066 | 0.033 | 0.033 | 0.033 | 0.033 | 0.033 | 0.033 | 0.033
Above-Grade Walls:	Interior and Exterior Construction Type: Wood frame
	Gross Area: Same as Rated Unit [2]
	Solar Absorptance = 0.75
	Emittance = 0.90
	Insulation: [3]
	Climate Zone: CZ 1 | CZ 2 | CZ 3 | CZ 4 | CZ 4 C & 5 | CZ 6 | CZ 7 | CZ 8 **Wall Assembly U-Factor:** 0.064 | 0.064 | 0.064 | 0.064 | 0.064 | 0.051 | 0.051 | 0.036
Thermally Isolated Sunrooms:	None
Doors:	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]
	U-Factors and SHGCs: **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:	Total Area: AG = 0.15 x CFA x FA x F, without exceeding available wall area [5]
	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
	Assembly U-Factors and SHGCs:
	Climate Zone: 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 2015 IgCC
	Climate Zone: CZ 1 | CZ 2 | CZ 3 | CZ 4 | CZ 4 C & 5 | CZ 6 | CZ 7 | CZ 8 **Fixed Window U-Factor:** 0.48 | 0.48 | 0.44 | 0.36 | 0.36 | 0.34 | 0.28 | 0.28 **Operable Window U-Factor:** 0.62 | 0.62 | 0.57 | 0.43 | 0.43 | 0.41 | 0.35 | 0.35 **SHGC:** 0.25 | 0.25 | 0.25 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40
Skylights:	None
Ceilings:	Construction Type: Wood frame
	Gross Area: Same as Rated Unit [2]
	Insulation: [3]
	Climate Zone: CZ 1 | CZ 2 | CZ 3 | CZ 4 | CZ 4 C & 5 | CZ 6 | CZ 7 | CZ 8 **Ceiling Assembly U-Factor:** 0.027 | 0.027 | 0.027 | 0.027 | 0.021 | 0.021 | 0.021 | 0.021
Top Floor Unit Attics:	Construction Type: Vented with aperture = 1sq. ft. per 300 sq. ft. ceiling area
	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)

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. 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 4.2 COP and 2) a boiler with the balance of the capacity of (1-1/4.2) or 76.19%

Fuel Type: Same as Rated Unit [2, 6]

System Type: Same as Rated Unit [2], except Reference Design shall be configured with air-source heat pump in CZ 1-6 where Rated Unit is modeled with air-source or ground-source heat pump, electric strip heat or electric baseboard heat, and Reference Design shall be configured with ground-source heat pump in CZ 7 & 8 where Rated Unit is modeled with air-source or ground-source heat pump, electric strip heat or electric baseboard heat; applicable efficiency selected from below [7]

Climate Zone:	CZ 1	CZ 2	CZ 3	CZ 4	CZ 4C & 5	CZ 6	CZ 7	CZ 8
Gas Furn. AFUE:	80	80	80	95	95	95	95	95
Oil Furn. AFUE:	80	80	80	85	85	85	85	85
Gas Boiler AFUE:	80	80	80	90	90	90	90	90
Oil Boiler AFUE:	80	80	80	86	86	86	86	86
Central Boiler, ≥ 300 KBtu/h E_t:	86	86	86	86	86	86	86	86
Central Boiler w/WLHP, ≥ 300 KBtu/h E_t:	89	89	89	89	89	89	89	89
Air-Source Heat Pump HSPF:	8.2	8.2	8.2	8.5	9.25	9.5	n/a	n/a
Air-Source Heat Pump Backup:	Electric	Electric	Electric	Electric	Electric	Electric	n/a	n/a
Ground-Source Heat Pump COP:	n/a	n/a	n/a	n/a	n/a	n/a	3.6	3.6

For non-electric warm 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, using the capacity determined in this Section. For non-electric boilers, serving the Rated Unit and other units, the Electric Auxiliary Energy shall be determined in accordance with the methodology for the Rated Home in ANSI / RESNET / ICC Std. 301, using motor efficiency of 0.85

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

Fuel Type: Same as Rated Unit [2, 6]

System Type: Same as Rated Unit [2], except Reference Design shall be configured with air-source heat pump in CZ 1-6 where Rated Unit is modeled with air-source or ground-source heat pump, electric strip heat, or electric baseboard heat; and Reference Design shall be configured with ground-source heat pump in CZ 7 & 8 where Rated Unit is modeled with air-source or ground-source heat pump, electric strip heat, or electric baseboard heat; applicable efficiency selected from below [8]

Climate Zone:	CZ 1	CZ 2	CZ 3	CZ 4	CZ 4 C & 5	CZ 6	CZ 7	CZ 8
AC SEER:	15	15	15	13	13	13	13	13
Air-Source Heat Pump SEER:	15	15	15	15	15	15	n/a	n/a
Ground-Source Heat Pump EER:	n/a	n/a	n/a	n/a	n/a	n/a	17.1	17.1

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 Unit in ANSI / RESNET / ICC Std. 301, using motor efficiency of 0.85. For chillers, Reference Design $SEER_{eq}$ shall be determined using 0.78 kW/ton. For water-loop heat pumps, Reference Design $SEER_{eq}$ shall be determined using 14 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 equipment specified in the Lighting, Appliances, Fixtures & Internal Gains Section [9]

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 0.85 for motor efficiency and using the same HP as the pump serving the Rated Unit

Fuel Type: Same as Rated Unit [2, 6]

System Type (when Rated Unit is served by a commercial system): Same as system serving the Rated Unit. For boilers or water heaters, use 85% E_t. For electric water heaters, use 0.95 EF

System Type (when Rated Unit is served by residential systems): Conventional storage water heater with tank size equal to that of Rated Unit, unless Rated Unit uses instantaneous water heater in which case select 50 gallon tank for gas systems and 60 gallon tank for electric systems. Select applicable efficiency from below using tank size of Reference Design

Gas Storage Tank Capacity:	≤ 55 Gal	> 55 Gal
Gas DHW EF:	0.67 EF	0.77 EF

Electric Storage Tank Capacity:	≤ 55 Gal	> 55 Gal
Electric DHW EF:	0.95 EF	2.00 EF

Oil Storage Tank Capacity: [10]	30 Gallon	40 Gallon	50 Gallon	60 Gallon	70 Gallon	80 Gallon
Oil DHW EF:	0.64	0.62	0.60	0.58	0.56	0.54

Thermal Distribution Systems:

Duct Leakage to Outside: 0 CFM25 per 100 sq. ft. of conditioned floor area

Duct Insulation: None, because 100% of ducts are in conditioned space

Duct Surface Area: Same as Rated Unit [2]

Supply and Return Duct Locations shall be configured to be 100% in conditioned space

Ceiling Type:	100% Adiabatic	All Other
One Story Unit:	100% Conditioned	100% Conditioned
All other Units:	100% Conditioned	100% 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

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

<table>
<tr><td rowspan="5">Infiltration & Mechanical Ventilation:</td><td colspan="9">Compartmentalization Rates: 0.3 cfm50/ft2 Enclosure Area, with Aext applied to calculate Infiltration Rate, in accordance with ANSI / RESNET / ICC Std. 301</td></tr>
<tr><td colspan="9">Mechanical ventilation system without heat recovery</td></tr>
<tr><td colspan="9">Rate: CFM = 0.01 * CFA + 7.5 * (Nbr + 1), where CFA = Conditioned Floor Area and Nbr = Number of Bedrooms; Runtime: 24 Hours / Day</td></tr>
<tr><td colspan="9">Fan Watts: Watts = CFM Rate / 2.8 CFM per Watt, where CFM Rate is determined above</td></tr>
<tr><td>Climate Zone:
Ventilation Type:</td><td>CZ 1
Supply</td><td>CZ 2
Supply</td><td>CZ 3
Supply</td><td>CZ 4
Supply</td><td>CZ 4 C & 5
Exhaust</td><td>CZ 6
Exhaust</td><td>CZ 7
Exhaust</td><td>CZ 8
Exhaust</td></tr>
<tr><td rowspan="8">Lighting, Appliances, Fixtures & Internal Gains:</td><td colspan="9">Lighting: Fraction of qualifying Tier I fixtures to all fixtures in qualifying light fixture locations 90% for interior; 0% for exterior and garage</td></tr>
<tr><td colspan="9">Refrigerator: 423 kWh per year</td></tr>
<tr><td colspan="9">Dishwasher: 0.66 EF, Place Setting Capacity Same as Rated Unit [2]; use 12 settings if no dishwasher installed in Rated Unit</td></tr>
<tr><td colspan="9">Clothes Washer: Use the ENERGY STAR values below, even if no clothes washer is installed or if the ratio of dwelling units to installed washers is more than 14. 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</td></tr>
<tr><td></td><td colspan="2">LER</td><td colspan="2">$/kWh</td><td>AGC</td><td><b>$/therm</td><td>CAPw</td><td>IMEF</td></tr>
<tr><td>ENERGY STAR</td><td colspan="2">152</td><td colspan="2">0.12</td><td>12</td><td>1.09</td><td>4.2</td><td>2.06</td></tr>
<tr><td colspan="9">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</td></tr>
<tr><td colspan="9">Ceiling Fan: 122 CFM per Watt; Quantity = Number of bedrooms + 1 when ceiling fans present in the Rated Unit; otherwise Quantity = 0</td></tr>
<tr><td colspan="9">Water fixtures: all showers and faucets ≤ 2.0 gpm</td></tr>
<tr><td colspan="9">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</td></tr>
<tr><td rowspan="2">Internal Mass:</td><td colspan="9">Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301</td></tr>
<tr><td colspan="9">Additional mass specifically designed as a Thermal Storage Element for the Rated Unit shall be excluded</td></tr>
</table>

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. 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.
6. 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.
7. 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.
8. For a Rated Unit without a cooling system, the ENERGY STAR Multifamily Reference Design shall be configured with a 13 SEER electric air conditioner.
9. 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.
10. To determine domestic hot water (DHW) EF requirements for additional tank sizes, use the following equation: Oil DHW EF ≥ 0.70 - (0.002 x Tank Gallon Capacity).

~~For a Rated Unit with conditioned space below, that does not indirectly use corridor air as the ventilation supply air, 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*.~~