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Historical Document

This document is provided for reference because it has been superseded by a more recent Version or Revision.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 <u>Program Requirements</u> 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 energystar.gov.



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 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.

Revised 05/09/2022



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Exhibit 1: Expanded ENERGY STAR Multifamily Reference Design Definition

Building	Exhibit 1: Expanded Ent	-1101 017	XIX MIGH	uiiiiy	TCICICIT	c besign ben	11111011				
Component	ent 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 Types Come as Poted Unit 2 expost: Conditioning Types Come as Poted Unit 2 expost:										
	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 Find Side of Walls		pplies to c	onditioned	basements;	if applicable, insulati	on shall be	located on	interior		
	Floor assemblies above crawlspace for	indations shal	l he confid	ured to me	et the annlic	able floor assembly l	I-factor liste	ed in the hu	ildina		
	component section for Floors Over Und						o idoloi iiol	od III tilo bu	namg		
	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										
	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: Slab Insulation Depth (ft):	0 0	0 0	10 2	10 4	10 4	10 4	10 4	10 4		
	Basement Wall Assembly U-Factor:	0.360	0.360	0.091	0.059	0.050	0.050	0.050	0.050		
Floors Over	Construction Type: Wood frame	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000		
Unconditioned	Gross Area: Same as Rated Unit ²										
Space	Insulation: 3, 4										
Volumes,	Climate Zone: 5	CZ 1	CZ 2	CZ 3	CZ 4	CZ 4 C & 5	CZ 6	CZ 7	CZ 8		
Non-Freezing											
Space or outdoor	Floor Assembly U-Factor:	0.064	0.064	0.047	0.047	0.033	0.033	0.028	0.028		
environment:	, , , , , , , , , , , , , , , , , , , ,										
Above-Grade	Interior and Exterior Construction Type: Woo	nd frame									
Walls,	Gross Area: Same as Rated Unit ²	<u> </u>									
adjacent to	Solar Absorptance = 0.75										
Exterior or	Emittance = 0.90										
Garage:	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 p			mize air lea	kage betwee	en the door and door	frame, to a	void the 140	CFM50		
	addition to measured airflow per ANSI / RES	NET / ICC Sto	1. 380								
	Orientation: Same as Rated Unit ² Door Type:	Opaque		- 4	/2 L ito	> 1/2-Lite CZ	4.2	> 1/2-Lite	C7 4 9		
	U-Factor:	0,17	,	≤ 1/2-Lite 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, witho	ut exceeding a	available w	/all area ⁸							
	Orientation: Same as Rated Unit 2, by percer										
	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		
1	Class AW Assembly U-Factors (i.e., Structur										
	Climate Zone: 5	CZ 1	CZ 2	CZ 3	CZ 4	CZ 4 C & 5	CZ 6	CZ 7	CZ 8		
1	Fixed Window U-Factor:	0.48	0.43	0.40	0.34	0.34	0.32	0.28	0.27		
1	Operable Window U-Factor:	0.59	0.57	0.51	0.43	0.43	0.40	0.34	0.30		
Claritates.	SHGC:	0.25	0.25	0.25	0.40	0.40	0.40	0.40	0.40		
Skylights: Ceilings,	None Construction Type: Wood frame										
adjacent to	Gross Area: Same as Rated Unit ²										
Exterior or	Insulation: 1,3										
Unconditioned	Climate Zone: 5	CZ 1	CZ 2	CZ 3	CZ 4	CZ 4 C & 5	CZ 6	CZ 7	CZ 8		
Space	Ceiling Assembly U-Factor:	0.035	0.026	0.024	0.024	0.024	0.024	0.024	0.024		
Volumes: Attics:	Construction Type: Vented with aperture = 1					0.024	0.024	0.02-	0.024		
Autos.	Radiant Barrier: None	34. II. PEI 300	34. II. CEII	ing area							
Roofs:	Construction Type: Composition shingle on wood sheathing										
	Gross Area: Same as Rated Unit ²										
	Solar Absorptance = 0.92										
	Emittance = 0.90										
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ENERGY STAR Multifamily New Construction, Version 1.2 (Rev. 02)

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

Internal					e Design											
	Same as Energy Rating Reference Home, as															
Mass:	Additional mass specifically designed as a Thermal Storage Element for the Rated Unit shall be excluded Lighting: Fraction of qualifying Tior Lightures to all fixtures in qualifying light fixture locations 100% for exterior; 100% for exterior and garage															
Lighting,	Lighting: Fraction of qualifying Tier I fixtures to all fixtures in qualifying light fixture locations 100% for interior; 100% for exterior and garage															
Appliances,	Refrigerator: 450 kWh per year															
Fixtures & Internal	Dishwasher: Capacity: Same as Rated Unit ²					Rated Unit										
Gains:	For Standard capacity: LER = 270, GHWC =															
Gairis.	For Compact capacity: LER = 203, GHWC =						1 24 41 2									
	Ceiling Fan: 122 CFM per Watt; Quantity = N															
	Clothes Washer: If clothes washer present in					ent" Standard	Clothes Wa	asher Model;	otherwise							
	same as Energy Rating Reference Home, as	•				Ct4 201										
	Clothes Dryer: Same as Energy Rating Refer Water fixtures: all showers and faucets ≤ 2.0		as delined b	ANSI / RE	SINET / ICC	3lu. 30 I										
	Internal Gains: Same as Energy Rating Refe		as defined b	ANCI / DE	CNICT / ICC	Ctd 201 avaa	nt for adjus	tmonto for th	a liabtina							
	refrigerator, dishwasher, clothes washer, and				SNET / ICC	Sid. 301, exce	pt for adjus	uments for th	ie lighting,							
Heating	Heating capacity shall be selected in accorda				ads calculat	ed for the Refe	erence Desi	ign in accord	ance with							
Systems:	ACCA Manual J, Eighth Edition, ASHRAE Ha															
Cyclomo.	degraded capacity from other-than-Grade I in															
	Home. Where heat from a central boiler is dis															
	the Rated Home in ANSI / RESNET / ICC Sto															
	separate heating systems: 1) a heat pump wi															
	boiler with the balance of the capacity of (1-1															
	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 refrigera			· ·	***			111.91								
	System Type: Same as Rated Unit ² , except			configured	with air-soul	rce heat pump	where Rate	ed Unit has e	electric							
	strip heat or electric baseboard heat; efficiend				C7.4	C7 4C 9 E			C7 0							
	Climate Zone: ⁵ Gas Furnace AFUE:	CZ 1 80	CZ 2 80	CZ 3 80	CZ 4 90	CZ 4C & 5	CZ 6 95	CZ 7 95	CZ 8 95							
	Gas Boiler AFUE:	80	80	80	90	95 95	95 95	95 95	95 95							
	Central Boiler, ≥ 300 KBtu/h E _t :	80	80	80	86	95 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							
Cooling	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 capacity shall be selected in accordance with ACCA Manual S based on loads calculated for the Reference Design in accordance with															
Journa							ACCA Manual J, Eighth Edition, ASHRAE Handbook of Fundamentals, or an equivalent computation procedure. For forced-air HVAC systems,									
	ACCA Manual J, Eighth Edition, ASHRAE Ha	andbook of Fu	undamentals	or an equiv	alent compu	tation procedu	re. For forc	ed-air HVAC	systems,							
Systems:	ACCA Manual J, Eighth Edition, ASHRAE Hadegraded capacity from Grade III install shall	andbook of Fu be accounte	undamentals d for using sa	or an equivame method	alent compu ology applie	tation procedu d to Energy Ra	re. For forcating Refere	ed-air HVAC ence Home								
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	ACCA Manual J, Eighth Edition, ASHRAE Hadegraded capacity from Grade III install shall Fuel Type: Same as Rated Unit, except Refe Installation Quality: For forced-air HVAC syst	andbook of Fu be accounter rence Design ems, Grade I	undamentals d for using sa n shall be cor I -20% blowe	or an equivame method figured with	alent compu ology applie gas where F	tation procedu d to Energy Ra Rated Unit has	re. For forc ating Refere non-electri	ed-air HVAC ence Home c equipment	2, 10							
	ACCA Manual J, Eighth Edition, ASHRAE Hadegraded capacity from Grade III install shall Fuel Type: Same as Rated Unit, except Refe Installation Quality: For forced-air HVAC syst for AC's & air-source heat pumps, Grade III r	andbook of Fu be accounted rence Design ems, Grade I efrigerant und	undamentals d for using sa n shall be cor I -20% blowe dercharge	or an equivame method figured with r fan airflow	alent compu ology applied gas where Fordeviation, Go	tation procedu d to Energy Ra Rated Unit has Grade II 0.52 W	re. For force ating Reference non-electri // CFM blow	ed-air HVAC ence Home c equipment wer fan effici	ency and,							
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ENERGY STAR Multifamily New Construction, Version 1.2 (Rev. 02)

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

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Thermal Distribution	Duct Leakage to Outside: 0 CFM25 per 100 sq. ft. of conditioned floor area										
	Duct Insulation: None										
Systems:	Duct Surface Area: Same as Rate	d Unit ²									
	Supply and Return Duct Locations	shall be 100%	in condition	ed space							
Thermostat:	Type: Programmable										
	Temperature Setpoints: Same as RESNET / ICC Std. 301	Energy Rating I	Reference H	ome, but with	offsets for a μ	orogrammable tl	nermostat, a	s defined by A	ANSI /		
Infiltration & Mechanical	Compartmentalization Rates: 0.3 cfm50/ft2 Enclosure Area, with Aext applied to calculate Infiltration Rate, in accordance with ANSI / RESNET / ICC Std. 301										
Ventilation:	Mechanical ventilation system with	nout heat recov	ery								
	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		



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

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.
- 2021 IECC Climate Zone designations, as defined and illustrated in <u>Section R301</u> 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.