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Historical Document

This document is provided for reference because it has been superseded by a more recent Version or Revision.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 301-2014) ENERGY STAR Multifamily New Construction, Version 1.1 (Rev. 01)

National ERI Target Procedure for use with ANSI/RESNET/ICC 301-2014

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 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 301-2014 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 301-2014 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 301-2019) must instead be used to determine the ENERGY STAR ERI Target when using ANSI / RESNET / ICC Standard 301-2019.

Revised 10/18/2019



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

Exhibit 1: Expanded ENERGY STAR Multifamily Reference Design Definition

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Building Component	nent 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 Relation Relatio		pplies to c	conditioned	basements;	if applicable, insulati	on shall be	located on i	interior	
	side of walls									
	Floor assemblies above crawlspace four			jured to me	et the applic	able floor assembly l	J-factor list	ed in the bui	ilding	
	component section for Floors Over Uncc Slab floors with a floor surface less than			ho inculato	d to the Slah	Inculation P value	The inculati	on chall ovt	and	
	downward from the top of the slab on the									
	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	0	0	0	7.5	7.5	7.5	10	12.5	
	Continuous Insulation R-Value:	0	-		7.0	7.0	7.0	10	12.0	
Floors Over	Construction Type: Wood frame									
Unconditioned	Gross Area: Same as Rated Unit ²									
Spaces:	Insulation: 3, 4							<u></u>		
Ì	Climate Zone:	CZ 1	CZ 2	CZ 3	CZ 4	CZ 4 C & 5	CZ 6	CZ 7	CZ 8	
A	Floor Assembly U-Factor:	0.066	0.033	0.033	0.033	0.033	0.033	0.033	0.033	
Above-Grade	Interior and Exterior Construction Type: Wood	frame								
Walls:	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	
Thormally	Wall Assembly U-Factor:	0.064	0.064	0.064	0.064	0.064	0.051	0.051	0.036	
Thermally Isolated	None									
Sunrooms:	Notice									
Doors:	Area: Same as Rated Unit ²									
200.0.	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).25	0.25		0.40		
Glazing:	Total Area: AG = 0.15 x CFA x FA x F, withou	t exceeding a	available w	vall area ⁵						
	Orientation: Same as Rated Unit ² , by percentage of area									
	Interior Shade Coefficient: Same as Energy R	ating Referer	nce Home	, as defined	d by ANSI / F	RESNET / ICC Std. 3	01			
	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., Structura	·								
	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	
Claudiadas -	Mana									
Skylights:	None									
Skylights: Ceilings:	Construction Type: Wood frame									
, ,	Construction Type: Wood frame Gross Area: Same as Rated Unit ²									
, ,	Construction Type: Wood frame Gross Area: Same as Rated Unit ² Insulation: ³	C7.4	C7 2	C7 2	C7 4	C7 4 C 9 E	C7 6	C7 7	C7 9	
, ,	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	
Ceilings:	Construction Type: Wood frame Gross Area: Same as Rated Unit ² Insulation: ³ Climate Zone: Ceiling Assembly U-Factor:	0.027	0.027	0.027	CZ 4 0.027	CZ 4 C & 5 0.021	CZ 6 0.021	CZ 7 0.021	CZ 8 0.021	
Ceilings: Top Floor Unit	Construction Type: Wood frame Gross Area: Same as Rated Unit ² Insulation: ³ Climate Zone: Ceiling Assembly U-Factor: Construction Type: Vented with aperture = 1s	0.027	0.027	0.027						
Ceilings: Top Floor Unit Attics:	Construction Type: Wood frame Gross Area: Same as Rated Unit ² Insulation: ³ Climate Zone: Ceiling Assembly U-Factor: Construction Type: Vented with aperture = 1s Radiant Barrier: None	0.027 q. ft. per 300	0.027 sq. ft. ceil	0.027						
Ceilings: Top Floor Unit	Construction Type: Wood frame Gross Area: Same as Rated Unit ² Insulation: ³ Climate Zone: Ceiling Assembly U-Factor: Construction Type: Vented with aperture = 1s Radiant Barrier: None Construction Type: Composition shingle on we	0.027 q. ft. per 300	0.027 sq. ft. ceil	0.027						
Ceilings: Top Floor Unit Attics:	Construction Type: Wood frame Gross Area: Same as Rated Unit ² Insulation: ³ Climate Zone: Ceiling Assembly U-Factor: Construction Type: Vented with aperture = 1s Radiant Barrier: None Construction Type: Composition shingle on we Gross Area: Same as Rated Unit ²	0.027 q. ft. per 300	0.027 sq. ft. ceil	0.027						
Ceilings: Top Floor Unit Attics:	Construction Type: Wood frame Gross Area: Same as Rated Unit ² Insulation: ³ Climate Zone: Ceiling Assembly U-Factor: Construction Type: Vented with aperture = 1s Radiant Barrier: None Construction Type: Composition shingle on we	0.027 q. ft. per 300	0.027 sq. ft. ceil	0.027						



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

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

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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									
Systems.	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									
	system Type: Same as Rated Unit -, except Reference Design shall be configured with air-source heat pump in C2 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									
	electric baseboard heat; applicable efficiency				cource or g	round oddioo n	out pump, or	out out pri	out of	
	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	
	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 nor	n-electric boile	rs, the Elect	ric Auxiliary E	nergy shall be	e determined in	accordance v	vith the me	thodology	
	for the Energy Rating Reference Home	in ANSI / RES	SNET / ICC	Std. 301, usir	g the capacity	determined in	this Section			
Cooling	Cooling capacity shall be selected in ac	cordance with	ACCA Man	ual S based	on loads calcu	lated for the Re	eference Desig	n in accord	dance with	
Systems:	ACCA Manual J, Eighth Edition, ASHR	AE Handbook	of Fundame	ntals, or an e	quivalent com	putation proce	dure			
	Fuel Type: Same as Rated Unit 2,6									
	System Type: Same as Rated Unit 2, ex									
	modeled with air-source or ground-sour									
	with ground-source heat pump in CZ 7				ir-source or g	round-source h	eat pump, ele	ctric strip h	eat, or	
	electric baseboard heat; applicable effic									
	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	
			ranga Hama	as defined h	W ANSI / RES	SNET / ICC Std	301 except for	or reduced	usage	
Service	Use (Gallons per Day): Same as Energ						. oo i, choopi ii			
Water	resulting from the equipment specified i	n the Lighting	, Appliances	, Fixtures & I	nternal Gains	Section 9				
Water Heating	resulting from the equipment specified in Tank Temperature: Same as Energy Ra	n the Lighting	, Appliances	, Fixtures & I	nternal Gains	Section 9				
Water	resulting from the equipment specified in Tank Temperature: Same as Energy Range Recirculation Pump: 0 kWh per year	n the Lighting	, Appliances	, Fixtures & I	nternal Gains	Section 9				
Water Heating	resulting from the equipment specified in Tank Temperature: Same as Energy Range Recirculation Pump: 0 kWh per year Fuel Type: Same as Rated Unit 2,6	n the Lighting ating Reference	, Appliances ce Home, as	, Fixtures & Indefined by A	nternal Gains NSI / RESNE	Section ⁹ T / ICC Std. 30	1			
Water Heating	resulting from the equipment specified in Tank Temperature: Same as Energy Range Recirculation Pump: 0 kWh per year Fuel Type: Same as Rated Unit 2,6 System Type: Conventional storage was	n the Lighting ating Reference ter heater with	, Appliances ce Home, as n tank size e	, Fixtures & Indefined by A	nternal Gains NSI / RESNE	Section ⁹ T / ICC Std. 30 unless Rated U	1 nit uses instan	taneous wa	ater heater	
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Water Heating	resulting from the equipment specified in Tank Temperature: Same as Energy Rank Recirculation Pump: 0 kWh per year Fuel Type: Same as Rated Unit 2,6 System Type: Conventional storage was in which case select 50 gallon tank for size of Reference Design Gas Storage Tank Capacity:	n the Lighting ating Reference ter heater with	, Appliances ce Home, as n tank size e	, Fixtures & II defined by A qual to that o tank for elec ≤ 55 Gal	nternal Gains NSI / RESNE	Section ⁹ T / ICC Std. 30 unless Rated U	nit uses instan le efficiency fro	taneous wa	ater heater	
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Water Heating	resulting from the equipment specified in Tank Temperature: Same as Energy Rank Recirculation Pump: 0 kWh per year Fuel Type: Same as Rated Unit 2,6 System Type: Conventional storage was in which case select 50 gallon tank for a size of Reference Design Gas Storage Tank Capacity: Gas DHW EF: Electric Storage Tank Capacity:	n the Lighting ating Reference ter heater with	, Appliances ce Home, as n tank size e	qual to that o tank for elec ≤ 55 Gal 0.67 EF ≤ 55 Gal	nternal Gains NSI / RESNE	Section ⁹ T / ICC Std. 30 unless Rated U	nit uses instan le efficiency fro > 55 Gal 0.77 EF > 55 Gal	taneous wa	ater heater	
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Water Heating Systems: Thermal Distribution	resulting from the equipment specified if Tank Temperature: Same as Energy Ra Recirculation Pump: 0 kWh per year Fuel Type: Same as Rated Unit ^{2, 6} System Type: Conventional storage wain which case select 50 gallon tank for gize of Reference Design Gas Storage Tank Capacity: Gas DHW EF: Electric Storage Tank Capacity: Electric DHW EF: Oil Storage Tank Capacity: ¹⁰ Oil DHW EF: Duct Leakage to Outside: 0 CFM25 per Duct Insulation: None, because 100% of Duct Surface Area: Same as Rated Unit Supply and Return Duct Locations shall Ceiling Type:	n the Lighting ating Reference ter heater with gas systems a systems a system a syst	o Gallon 0.64 conditioned d to be 100%	qual to that o tank for elect 55 Gal 0.67 EF 55 Gal 0.95 EF 40 Gallon 0.62 floor area space 6 in condition Adiabatic	nternal Gains NSI / RESNE f Rated Unit, the tric systems. Section 0.60	Section ⁹ T / ICC Std. 30 unless Rated U Select applicab	nit uses instan le efficiency fro > 55 Gal 0.77 EF > 55 Gal 2.00 EF 70 Gallor 0.56	taneous wa om below u a 80 G 0.5	ater heater sing tank allon	
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ENERGY STAR Multifamily New Construction, Version 1.1 (Rev. 01)

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								
	same as the Rated Uni	· · · · · · · · · · · · · · · · · · ·							
	Ceiling Fan: 122 CFM		Number of bedroom	s + 1 when ceiling fa	ans present in the Rat	ted Unit; otherwise C	Quantity = 0		
		per Watt; Quantity =		s + 1 when ceiling fa	ans present in the Rat	ted Unit; otherwise C	Quantity = 0		
	Ceiling Fan: 122 CFM	per Watt; Quantity = vers and faucets ≤ 2 as Energy Rating Re	0 gpm eference Home, as de	fined by ANSI / RES	SNET / ICC Std. 301,				
Internal	Ceiling Fan: 122 CFM Water fixtures: all show Internal Gains: Same a	per Watt; Quantity = vers and faucets ≤ 2 is Energy Rating Re r, clothes washer, c	0 gpm ference Home, as de lothes dryer, and ceili	fined by ANSI / RES	SNET / ICC Std. 301, this section		•		



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

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.
- 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).
- 11. In accordance with the RESNET Guidelines for Multifamily Energy Ratings, for a Rated Unit with conditioned space below, 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. The 15% reduction shall not be applied if the Rated Unit is located in a building where outdoor air for the Rated Unit is supplied to the corridor and is not directly ducted either into the Rated Unit or into the Rated Unit's HVAC system.

Revised 10/18/2019