# 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### **Historical Document**

This document is provided for reference because it has been superseded by a more recent Version or Revision.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 <a href="Implementation Timeline">Implementation Timeline</a> 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 <a href="mailto:energystar.gov">energystar.gov</a>.



## National ERI Target Procedure (ANSI 301-2019) ENERGY STAR Multifamily New Construction, Version 1 (Rev. 01)

#### 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 / 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 301-2019 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 301-2019 shall also be followed. Any exceptions shall be approved by EPA and reported at <a href="https://www.energystar.gov/ERIExceptions">www.energystar.gov/ERIExceptions</a>. 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 10/18/2019



ENERGY STAR Multifamily New Construction, Version 1 (Rev. 01)

**Exhibit 1: Expanded ENERGY STAR Multifamily Reference Design Definition** 

Building Component	Exhibit 1: Expanded ENERGY STAR Multifamily Reference Design Definition  Expanded ENERGY STAR Multifamily Reference Design Definition <sup>1</sup>											
Foundations:	Construction Type & Structural Mass: Same as Rated Unit <sup>2</sup> , 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 <sup>2</sup> , 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 <sup>2</sup>											
	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 aids of walls.											
	side of walls  • Floor assemblies above crawlspace foundations shall be configured to meet the applicable floor assembly U-factor listed in the building											
	Floor assemblies above crawispace foundations shall be configured to meet the applicable floor assembly o-factor listed in the building component section for Floors Over Unconditioned Spaces											
	<ul> <li>Slab floors with a floor surface less than 24" below grade shall be insulated to the Slab Insulation R-value. The insulation shall extend</li> </ul>											
	downward from the top of the slab on	the outside of t	he founda	ion wall ar	d then vertic	ally below-grade to	the Slab Insu	ulation Dept	th			
	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	Construction Type: Wood frame											
Unconditioned	Gross Area: Same as Rated Unit <sup>2</sup>											
Spaces:	Insulation: 3, 4											
- F 2:200.	Climate Zone:	CZ 1	CZ 2	CZ 3	CZ 4	CZ 4 C & 5	CZ 6	CZ 7	CZ 8			
	Floor Assembly U-Factor:	0.282	0.052	0.033	0.033	0.033	0.033	0.033	0.033			
Above-Grade	Interior and Exterior Construction Type: Wo		0.032	0.033	0.033	0.033	0.033	0.033	0.033			
Walls:	Gross Area: Same as Rated Unit <sup>2</sup>	ou name										
· · · · · · · ·	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:	0.089	0.089	0.089	0.064	0.051	0.051	0.051	0.036			
Thermally	Trail recombly or actors	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.000			
Isolated	None											
Sunrooms:												
Doors:	Area: Same as Rated Unit 2, with door seal			nize air lea	kage betwee	en the door and door	frame, to av	oid the 140	CFM50			
	addition to measured airflow per ANSI / RE	SNET / ICC Sto	d. 380									
	Orientation: Same as Rated Unit <sup>2</sup>							4/0.1.1/-				
	U-Factors and SHGCs:											
	U-Factors and SHGCs: Door Type:		aque			/2-Lite		> 1/2-Lite				
	U-Factors and SHGCs: Door Type: U-Factor:	0	.21			0.27	;	0.32				
Glazing:	U-Factors and SHGCs: Door Type: U-Factor: SHGC:	0 r	.21 n/a	vall area <sup>5</sup>			;					
Glazing:	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with	0 rout exceeding a	.21 n/a	/all area <sup>5</sup>		0.27	;	0.32				
Glazing:	U-Factors and SHGCs:  Door Type: U-Factor: SHGC:  Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit <sup>2</sup> , by perc	0 rout exceeding a entage of area	.21 n/a available v			0.27 0.30		0.32				
Glazing:	U-Factors and SHGCs:  Door Type: U-Factor: SHGC:  Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit <sup>2</sup> , by percontenting Shade Coefficient: Same as Energy	0 rout exceeding a entage of area	.21 n/a available v			0.27 0.30		0.32				
Glazing:	U-Factors and SHGCs:  Door Type: U-Factor: SHGC:  Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by perc Interior Shade Coefficient: Same as Energi External Shading: None	0 rout exceeding a entage of area	.21 n/a available v			0.27 0.30		0.32				
Glazing:	U-Factors and SHGCs:  Door Type: U-Factor: SHGC:  Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by perc Interior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs:	or nout exceeding a entage of area y Rating Referen	.21 n/a available w	, as defined	d by ANSI / F	0.27 0.30 RESNET / ICC Std. 3	301	0.32 0.30	C7 8			
Glazing:	U-Factors and SHGCs:  Door Type: U-Factor: SHGC:  Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by perc Interior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone:	nout exceeding a entage of area y Rating Referen	.21 n/a available v nce Home	, as defined	d by ANSI / F	0.27 0.30 RESNET / ICC Std. 3	301 CZ 6	0.32 0.30	CZ 8			
Glazing:	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by perc Interior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value:	nout exceeding a entage of area y Rating Reference CZ 1 0.60	.21 n/a available v nce Home CZ 2 0.60	cz 3 0.35	CZ 4 0.32	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30	CZ 6 0.30	0.32 0.30 CZ 7 0.30	0.30			
Glazing:	U-Factors and SHGCs:  Door Type: U-Factor: SHGC:  Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by perc Interior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC:	nout exceeding a entage of area y Rating Reference CZ 1 0.60 0.27	.21 n/a available v nce Home CZ 2 0.60 0.27	cz 3 0.35 0.30	d by ANSI / F	0.27 0.30 RESNET / ICC Std. 3	301 CZ 6	0.32 0.30				
Glazing:	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by perc Interior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC: Class AW Assembly U-Factors (i.e., Struct	nout exceeding a entage of area y Rating Reference CZ 1 0.60 0.27 ural) Windows b	.21 h/a available w nce Home  CZ 2 0.60 0.27 passed on 2	CZ 3 0.35 0.30 012 IECC	CZ 4 0.32 0.40	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30 0.40	CZ 6 0.30 0.40	0.32 0.30 CZ 7 0.30 0.40	0.30 0.40			
Glazing:	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by perco Interior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC: Class AW Assembly U-Factors (i.e., Struct Climate Zone:	nout exceeding a entage of area y Rating Reference CZ 1 0.60 0.27 ural) Windows b CZ 1	.21 n/a available w nce Home  CZ 2 0.60 0.27 passed on 2 CZ 2	CZ 3 0.35 0.30 012 IECC	CZ 4 0.32 0.40	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30 0.40 CZ 4 C & 5	CZ 6 0.30 0.40	0.32 0.30 CZ 7 0.30 0.40	0.30 0.40			
Glazing:	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by percontention of Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC: Class AW Assembly U-Factors (i.e., Struct Climate Zone: Fixed Window U-Factor	cz 1 0.60 0.27 ural) Windows b	.21 h/a available w nce Home  CZ 2 0.60 0.27 based on 2 CZ 2 0.50	CZ 3 0.35 0.30 012 IECC CZ 3 0.46	CZ 4 0.32 0.40 CZ 4 0.38	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30 0.40 CZ 4 C & 5 0.38	CZ 6 0.30 0.40 CZ 6 0.36	0.32 0.30 CZ 7 0.30 0.40 CZ 7 0.29	0.30 0.40 <b>CZ 8</b> 0.29			
Glazing:	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by percontention Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC: Class AW Assembly U-Factors (i.e., Struct Climate Zone: Fixed Window U-Factor Operable Window U-Factor	cz 1 0.50 0.65	.21 n/a available w nce Home  CZ 2 0.60 0.27 based on 2 CZ 2 0.50 0.65	CZ 3 0.35 0.30 012 IECC CZ 3 0.46 0.60	CZ 4 0.32 0.40  CZ 4 0.38 0.45	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30 0.40 CZ 4 C & 5 0.38 0.45	CZ 6 0.30 0.40 CZ 6 0.36 0.43	0.32 0.30 CZ 7 0.30 0.40 CZ 7 0.29 0.37	0.30 0.40 <b>CZ 8</b> 0.29 0.37			
	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by percontention of Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC: Class AW Assembly U-Factors (i.e., Struct Climate Zone: Fixed Window U-Factor	cz 1 0.60 0.27 ural) Windows b	.21 h/a available w nce Home  CZ 2 0.60 0.27 based on 2 CZ 2 0.50	CZ 3 0.35 0.30 012 IECC CZ 3 0.46	CZ 4 0.32 0.40 CZ 4 0.38	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30 0.40 CZ 4 C & 5 0.38	CZ 6 0.30 0.40 CZ 6 0.36	0.32 0.30 CZ 7 0.30 0.40 CZ 7 0.29	0.30 0.40 <b>CZ 8</b> 0.29			
Skylights:	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by perconterior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC: Class AW Assembly U-Factors (i.e., Struct Climate Zone: Fixed Window U-Factor Operable Window U-Factor SHGC: None	cz 1 0.50 0.65	.21 n/a available w nce Home  CZ 2 0.60 0.27 based on 2 CZ 2 0.50 0.65	CZ 3 0.35 0.30 012 IECC CZ 3 0.46 0.60	CZ 4 0.32 0.40  CZ 4 0.38 0.45	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30 0.40 CZ 4 C & 5 0.38 0.45	CZ 6 0.30 0.40 CZ 6 0.36 0.43	0.32 0.30 CZ 7 0.30 0.40 CZ 7 0.29 0.37	0.30 0.40 <b>CZ 8</b> 0.29 0.37			
	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by perconterior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC: Class AW Assembly U-Factors (i.e., Struct Climate Zone: Fixed Window U-Factor Operable Window U-Factor SHGC:	cz 1 0.50 0.65	.21 n/a available w nce Home  CZ 2 0.60 0.27 based on 2 CZ 2 0.50 0.65	CZ 3 0.35 0.30 012 IECC CZ 3 0.46 0.60	CZ 4 0.32 0.40  CZ 4 0.38 0.45	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30 0.40 CZ 4 C & 5 0.38 0.45	CZ 6 0.30 0.40 CZ 6 0.36 0.43	0.32 0.30 CZ 7 0.30 0.40 CZ 7 0.29 0.37	0.30 0.40 <b>CZ 8</b> 0.29 0.37			
Skylights:	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by percontention Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC: Class AW Assembly U-Factors (i.e., Struct Climate Zone: Fixed Window U-Factor Operable Window U-Factor SHGC: None Construction Type: Wood frame Gross Area: Same as Rated Unit ²	cz 1 0.50 0.65	.21 n/a available w nce Home  CZ 2 0.60 0.27 based on 2 CZ 2 0.50 0.65	CZ 3 0.35 0.30 012 IECC CZ 3 0.46 0.60	CZ 4 0.32 0.40  CZ 4 0.38 0.45	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30 0.40 CZ 4 C & 5 0.38 0.45	CZ 6 0.30 0.40 CZ 6 0.36 0.43	0.32 0.30 CZ 7 0.30 0.40 CZ 7 0.29 0.37	0.30 0.40 <b>CZ 8</b> 0.29 0.37			
Skylights:	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by percontention Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC: Class AW Assembly U-Factors (i.e., Struct Climate Zone: Fixed Window U-Factor Operable Window U-Factor SHGC: None Construction Type: Wood frame	cz 1 0.50 0.65 0.27	.21 h/a available water the control of the control	CZ 3 0.35 0.30 012 IECC CZ 3 0.46 0.60 0.30	CZ 4 0.32 0.40  CZ 4 0.38 0.45 0.40	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30 0.40 CZ 4 C & 5 0.38 0.45 0.40	CZ 6 0.30 0.40 CZ 6 0.36 0.43 0.40	0.32 0.30 CZ 7 0.30 0.40 CZ 7 0.29 0.37 0.40	0.30 0.40 CZ 8 0.29 0.37 0.40			
Skylights:	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by perconterior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC: Class AW Assembly U-Factors (i.e., Struct Climate Zone: Fixed Window U-Factor Operable Window U-Factor SHGC: None Construction Type: Wood frame Gross Area: Same as Rated Unit ² Insulation: ³ Climate Zone:	cz 1 0.50 0.65	.21 n/a available w nce Home  CZ 2 0.60 0.27 based on 2 CZ 2 0.50 0.65	CZ 3 0.35 0.30 012 IECC CZ 3 0.46 0.60 0.30	CZ 4 0.32 0.40  CZ 4 0.38 0.45	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30 0.40 CZ 4 C & 5 0.38 0.45	CZ 6 0.30 0.40 CZ 6 0.36 0.43 0.40	0.32 0.30 CZ 7 0.30 0.40 CZ 7 0.29 0.37 0.40	0.30 0.40 CZ 8 0.29 0.37 0.40			
Skylights: Ceilings:	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by perconterior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC: Class AW Assembly U-Factors (i.e., Struct Climate Zone: Fixed Window U-Factor Operable Window U-Factor SHGC: None Construction Type: Wood frame Gross Area: Same as Rated Unit ² Insulation: ³ Climate Zone: Ceiling Assembly U-Factor:	cz 1 0.50 0.65 0.27  CZ 1 0.60 0.27	.21 h/a available wavailable wava	CZ 3 0.35 0.30 012 IECC CZ 3 0.46 0.60 0.30	CZ 4 0.32 0.40  CZ 4 0.38 0.45 0.40	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30 0.40 CZ 4 C & 5 0.38 0.45 0.40 CZ 4 C & 5	CZ 6 0.30 0.40 CZ 6 0.36 0.43 0.40	0.32 0.30 CZ 7 0.30 0.40 CZ 7 0.29 0.37 0.40	0.30 0.40 CZ 8 0.29 0.37 0.40			
Skylights:	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by perconterior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC: Class AW Assembly U-Factors (i.e., Struct Climate Zone: Fixed Window U-Factor Operable Window U-Factor SHGC: None Construction Type: Wood frame Gross Area: Same as Rated Unit ² Insulation: ³ Climate Zone:	cz 1 0.50 0.65 0.27  Cz 1 0.50 0.65 0.27	.21 h/a available wavailable wava	CZ 3 0.35 0.30 012 IECC CZ 3 0.46 0.60 0.30  CZ 3 0.027 ing area	CZ 4 0.32 0.40  CZ 4 0.38 0.45 0.40	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30 0.40 CZ 4 C & 5 0.38 0.45 0.40 CZ 4 C & 5 0.027	CZ 6 0.30 0.40 CZ 6 0.36 0.43 0.40	0.32 0.30 CZ 7 0.30 0.40 CZ 7 0.29 0.37 0.40	0.30 0.40 CZ 8 0.29 0.37 0.40			
Skylights: Ceilings:	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by percontention Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC: Class AW Assembly U-Factors (i.e., Struct Climate Zone: Fixed Window U-Factor Operable Window U-Factor Operable Window U-Factor SHGC: None Construction Type: Wood frame Gross Area: Same as Rated Unit ² Insulation: ³ Climate Zone: Ceiling Assembly U-Factor: Construction Type: Vented with aperture = Radiant Barrier: In climate zones 1-3, if >10	cz 1 0.50 0.65 0.27  Cz 1 0.60 0.27  Cz 1 0.50 0.65 0.27	.21 n/a available w nce Home  CZ 2 0.60 0.27 based on 2 CZ 2 0.50 0.65 0.27  CZ 2 0.027 sq. ft. ceil ctwork are	CZ 3 0.35 0.30 012 IECC CZ 3 0.46 0.60 0.30  CZ 3 0.027 ing area	CZ 4 0.32 0.40  CZ 4 0.38 0.45 0.40	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30 0.40 CZ 4 C & 5 0.38 0.45 0.40 CZ 4 C & 5 0.027	CZ 6 0.30 0.40 CZ 6 0.36 0.43 0.40	0.32 0.30 CZ 7 0.30 0.40 CZ 7 0.29 0.37 0.40	0.30 0.40 CZ 8 0.29 0.37 0.40			
Skylights: Ceilings:	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by percontention Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC: Class AW Assembly U-Factors (i.e., Struct Climate Zone: Fixed Window U-Factor Operable Window U-Factor Operable Window U-Factor SHGC: None Construction Type: Wood frame Gross Area: Same as Rated Unit ² Insulation: ³ Climate Zone: Ceiling Assembly U-Factor: Construction Type: Vented with aperture = Radiant Barrier: In climate zones 1-3, if >10 Construction Type: Composition shingle or	cz 1 0.50 0.65 0.27  Cz 1 0.60 0.27  Cz 1 0.50 0.65 0.27	.21 n/a available w nce Home  CZ 2 0.60 0.27 based on 2 CZ 2 0.50 0.65 0.27  CZ 2 0.027 sq. ft. ceil ctwork are	CZ 3 0.35 0.30 012 IECC CZ 3 0.46 0.60 0.30  CZ 3 0.027 ing area	CZ 4 0.32 0.40  CZ 4 0.38 0.45 0.40	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30 0.40 CZ 4 C & 5 0.38 0.45 0.40 CZ 4 C & 5 0.027	CZ 6 0.30 0.40 CZ 6 0.36 0.43 0.40	0.32 0.30 CZ 7 0.30 0.40 CZ 7 0.29 0.37 0.40	0.30 0.40 CZ 8 0.29 0.37 0.40			
Skylights: Ceilings:	U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with Orientation: Same as Rated Unit ², by percontention Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Value: SHGC: Class AW Assembly U-Factors (i.e., Struct Climate Zone: Fixed Window U-Factor Operable Window U-Factor Operable Window U-Factor SHGC: None Construction Type: Wood frame Gross Area: Same as Rated Unit ² Insulation: ³ Climate Zone: Ceiling Assembly U-Factor: Construction Type: Vented with aperture = Radiant Barrier: In climate zones 1-3, if >10	cz 1 0.50 0.65 0.27  Cz 1 0.60 0.27  Cz 1 0.50 0.65 0.27	.21 n/a available w nce Home  CZ 2 0.60 0.27 based on 2 CZ 2 0.50 0.65 0.27  CZ 2 0.027 sq. ft. ceil ctwork are	CZ 3 0.35 0.30 012 IECC CZ 3 0.46 0.60 0.30  CZ 3 0.027 ing area	CZ 4 0.32 0.40  CZ 4 0.38 0.45 0.40	0.27 0.30 RESNET / ICC Std. 3 CZ 4 C & 5 0.30 0.40 CZ 4 C & 5 0.38 0.45 0.40 CZ 4 C & 5 0.027	CZ 6 0.30 0.40 CZ 6 0.36 0.43 0.40	0.32 0.30 CZ 7 0.30 0.40 CZ 7 0.29 0.37 0.40	0.30 0.40 CZ 8 0.29 0.37 0.40			
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## ENERGY STAR Multifamily New Construction, Version 1 (Rev. 01) Exhibit 1: Expanded ENERGY STAR Multifamily Reference Design Definition (Continued)

11	Exhibit 1: Expanded ENERGY S	. /			e pesigii	Delinitio	n (Contini	iea)						
Heating	Heating capacity shall be selected in accord	ance with ACC	CA Manual S	based on I	oads calcula	ted for the Ref	erence Desigi	n in accord	lance with					
Systems:	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 Des													
	heat pump with a capacity that is equal to th	e Reference D	esign neatir	ng load divid	ded by 4.2 CC	JP and 2) a bo	oller with the b	alance of t	ne					
	capacity of (1-1/4.2) or 76.19%													
	Fuel Type: Same as Rated Unit <sup>2,6</sup>													
	System Type: Same as Rated Unit <sup>2</sup> , 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 <sup>7</sup>													
	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	90	90	90	90	90					
	Oil Furn. AFUE:	80 80		80	85	85	85	85	85					
	Gas Boiler AFUE:	80	80	80	85	85	85	85	85					
	Oil Boiler AFUE:	80	80	80	85	85	85	85	85					
	Central Boiler, ≥ 300 KBtu/h Et:	86	86	86	86	86	86	86	86					
	Central Boiler w/WLHP, ≥ 300 KBtu/h E <sub>t</sub> :	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	3.5	3.5					
	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	Cooling capacity shall be selected in accordance							in accord	anco with					
Systems:	ACCA Manual J, Eighth Edition, ASHRAE H							i ili accoru	ance with					
Gysterns.	Fuel Type: Same as Rated Unit 2,6	andbook of 1 d	indamentais	, or arrequi	valent compt	itation procedi	ai <del>C</del>							
	System Type: Same as Rated Unit <sup>2</sup> , except	Reference De	sian shall h	e configure	with air-sou	rce heat numr	in CZ 1-6 wh	ere Rated	I Init is					
	modeled with air-source or ground-source he													
	with ground-source heat pump in CZ 7 & 8 v													
	electric baseboard heat; applicable efficienc			, a a a			a. pap, 0.00		, 0.					
	Climate Zone:	<u> </u>		CZ 3	CZ 4 C	Z 4 C & 5	CZ 6	CZ 7	CZ 8					
	AC SEER:	14.5	14.5	14.5	13	13	13	13	13					
	Air-Source Heat Pump SEER:	14.5	14.5	14.5	14.5	14.5	14.5	n/a	n/a					
	Ground-Source Heat Pump EER:	n/a	n/a	n/a	n/a	n/a	n/a	16.1	16.1					
	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								$SEER_{eq}$					
				shall be determined using 0.78 kW/ton. For water-loop heat pumps, Reference Design SEER <sub>eq</sub> shall be determined using 14 EER										
Service	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													
Water	resulting from the equipment specified in the	Lighting, Appl	liances, Fixt	defined by A ures, & Inte	rnal Gains Se	ection <sup>9</sup>		r reduced (	usage					
Water Heating	resulting from the equipment specified in the Tank Temperature: Same as Energy Rating	Lighting, Appl Reference Ho	liances, Fixtome, as defin	defined by A ures, & Inte ned by ANS	rnal Gains Se I / RESNET /	ection <sup>9</sup> ICC Std. 301	от, схосрі ю	r reduced (	usage					
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### ENERGY STAR Multifamily New Construction, Version 1 (Rev. 01)

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

Infiltration & Mechanical	Compartmentalization Rates: 0.3 cfm50/ft <sup>2</sup> Enclosure Area, with Aext applied to calculate Infiltration Rate, in accordance with ANSI / RESNET / ICC Std. 301										
Ventilation:		on system without he	eat recove	 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 / 2.2 CFM	per Watt	, where CFM	A Rate is deter	mined above	е			-	
	Climate Zone:		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	
Lighting,	Lighting: Fraction of qualifying Tier I fixtures to all fixtures in qualifying light fixture locations 90% for interior; 0% for exterior and garage										
Appliances,	Refrigerator: 423 kWh per year										
Fixtures &	Dishwasher: 0.66 EF, Place Setting Capacity Same as Rated Unit <sup>2</sup> ; use 12 settings if no dishwasher installed in Rated Unit										
Internal Gains:	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										
		LER		κWh	AGC		\$/therm	CAPw	ı	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										
Internal Same as Energy Rating Reference Home, as defined by ANSI / RESNET / ICC Std. 301										•	



#### ENERGY STAR Multifamily New Construction, Version 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, 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 Multifamily Reference 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).

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