# 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## **Historical Document**

This document is provided for reference because it has been superseded by a more recent Version or Revision.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 1.1 (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 1.1 (Rev. 01)

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

Building	Exhibit 1: Expanded ENERGY STAR Multifamily Reference Design Definition									
Component Foundations:	Expanded ENERGY STAR Multifamily Reference Design Definition <sup>1</sup> Construction Type & Structural Mass: Same as Rated Unit <sup>2</sup> , except:									
roundations.	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									
	<ul> <li>Basement Wall Continuous Insulation</li> </ul>	n R-Value only ap	oplies to c	conditioned	basements;	if applicable, insulati	on shall be	located on i	nterior	
	side of walls									
	Floor assemblies above crawlspace			jured to me	et the applic	able floor assembly t	J-factor liste	ed in the bu	ilding	
	<ul> <li>component section for Floors Over U</li> <li>Slab floors with a floor surface less t</li> </ul>			ha inculata	d to the Slah	Inculation P-value	The inculation	on shall ext	and	
	downward from the top of the slab of									
	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:		-	-	7.0	7.5	7.0	10	12.0	
Floors Over	Construction Type: Wood frame									
Unconditioned	Gross Area: Same as Rated Unit <sup>2</sup>									
Spaces:	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	Interior and Exterior Construction Type: W	ood frame								
Walls:	Gross Area: Same as Rated Unit <sup>2</sup>									
	Solar Absorptance = 0.75									
	Emittance = 0.90									
	Insulation: 3									
		CZ 1	CZ 2	CZ 3	CZ 4	CZ 4 C & 5	CZ 6	CZ 7	CZ 8	
	Climate Zone:								0.036	
	Wall Assembly U-Factor:	0.064	0.064	0.064	0.064	0.064	0.051	0.051	0.030	
Thermally Isolated Sunrooms:			0.064	0.064	0.064	0.064	0.051	0.051	0.030	
Isolated	Wall Assembly U-Factor:  None  Area: Same as Rated Unit <sup>2</sup> , with door sea	0.064 al properly installe	ed to minir							
Isolated Sunrooms:	Wall Assembly U-Factor:  None  Area: Same as Rated Unit <sup>2</sup> , with door sea addition to measured airflow per ANSI / R	0.064 al properly installe	ed to minir							
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Isolated Sunrooms:	Wall Assembly U-Factor:  None  Area: Same as Rated Unit <sup>2</sup> , with door sea addition to measured airflow per ANSI / R  Orientation: Same as Rated Unit <sup>2</sup> U-Factors and SHGCs:  Door Type:	0.064  al properly installe ESNET / ICC Std	ed to minir . 380	mize air lea ≤ 1	kage betwee	n the door and door	frame, to a	void the 140	) CFM50 CZ 4-8	
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Isolated Sunrooms:	Wall Assembly U-Factor:  None  Area: Same as Rated Unit ², with door sea addition to measured airflow per ANSI / R Orientation: Same as Rated Unit ² U-Factors and SHGCs: Door Type: U-Factor: SHGC: Total Area: AG = 0.15 x CFA x FA x F, with	0.064 al properly installe ESNET / ICC Std  Opaque 0.17 n/a thout exceeding a	ed to minir . 380	mize air lea	kage betwee	n the door and door > 1/2-Lite CZ 0.30	frame, to a	void the 140 > 1/2-Lite ( 0.30	) CFM50 CZ 4-8	
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Isolated Sunrooms: Doors:	Wall Assembly U-Factor:  None  Area: Same as Rated Unit ², with door sea addition to measured airflow per ANSI / R Orientation: Same as Rated Unit ² 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 per Interior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Factor: 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	O.064  al properly installe ESNET / ICC Std  Opaque 0.17 n/a thout exceeding a centage of area gy Rating Referen  CZ 1 0.40 0.25 tural) Windows be CZ 1 0.48 0.62	vailable value Home  CZ 2  0.40  0.25  assed on 2  CZ 2  0.48  0.62	mize air lea  ≤ 1 ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( (	/2-Lite 0.25 0.25 d by ANSI / F  CZ 4 0.30 0.40  CZ 4 0.36 0.43	> 1/2-Lite CZ 0.30 0.25 ESNET / ICC Std. 3 CZ 4 C & 5 0.27 0.40 CZ 4 C & 5 0.36 0.43	1-3  CZ 6 0.27 0.40  CZ 6 0.34 0.41	void the 140  > 1/2-Lite ( 0.30 0.40  CZ 7 0.27 0.40  CZ 7 0.28 0.35	CZ 4-8  CZ 8 0.27 0.40  CZ 8 0.28 0.35	
Isolated Sunrooms: Doors:  Glazing:  Skylights:	Wall Assembly U-Factor:  None  Area: Same as Rated Unit ², with door sea addition to measured airflow per ANSI / R Orientation: Same as Rated Unit ² 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 per Interior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Factor: 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	O.064  al properly installe ESNET / ICC Std  Opaque 0.17 n/a thout exceeding a centage of area gy Rating Referen  CZ 1 0.40 0.25 tural) Windows be CZ 1 0.48 0.62	vailable value Home  CZ 2  0.40  0.25  assed on 2  CZ 2  0.48  0.62	mize air lea  ≤ 1 ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( (	/2-Lite 0.25 0.25 d by ANSI / F  CZ 4 0.30 0.40  CZ 4 0.36 0.43	> 1/2-Lite CZ 0.30 0.25 ESNET / ICC Std. 3 CZ 4 C & 5 0.27 0.40 CZ 4 C & 5 0.36 0.43	1-3  CZ 6 0.27 0.40  CZ 6 0.34 0.41	void the 140  > 1/2-Lite ( 0.30 0.40  CZ 7 0.27 0.40  CZ 7 0.28 0.35	CZ 4-8  CZ 8 0.27 0.40  CZ 8 0.28 0.35	
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Skylights: Ceilings:	Wall Assembly U-Factor:  None  Area: Same as Rated Unit ², with door sea addition to measured airflow per ANSI / R Orientation: Same as Rated Unit ² 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 per Interior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Factor: 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:	O.064  al properly installe ESNET / ICC Std  Opaque 0.17 n/a thout exceeding a centage of area gy Rating Referen  CZ 1 0.40 0.25 tural) Windows b  CZ 1 0.48 0.62 0.25  CZ 1 0.027	vailable value Home  CZ 2 0.40 0.25 ased on 2 CZ 2 0.48 0.62 0.25	mize air lea  ≤ 1.  (vall area <sup>5</sup> , as defined  CZ 3  0.30  0.25  015 lgCC  CZ 3  0.44  0.57  0.25  CZ 3  0.027	/2-Lite 0.25 0.25 0.25 d by ANSI / F CZ 4 0.30 0.40 CZ 4 0.36 0.43 0.40	> 1/2-Lite CZ 0.30 0.25 EESNET / ICC Std. 3 CZ 4 C & 5 0.27 0.40 CZ 4 C & 5 0.36 0.43 0.40	71-3 01 CZ 6 0.27 0.40 CZ 6 0.34 0.41 0.40	void the 140  > 1/2-Lite (	CZ 8 0.27 0.40 CZ 8 0.28 0.35 0.40	
Isolated Sunrooms: Doors:  Glazing:  Skylights: Ceilings:	Wall Assembly U-Factor:  None  Area: Same as Rated Unit ², with door sea addition to measured airflow per ANSI / R Orientation: Same as Rated Unit ² 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 per Interior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Factor: 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: Construction Type: Vented with aperture =	O.064  al properly installe ESNET / ICC Std  Opaque 0.17 n/a thout exceeding a centage of area gy Rating Referen  CZ 1 0.40 0.25 tural) Windows b  CZ 1 0.48 0.62 0.25  CZ 1 0.027	vailable value Home  CZ 2 0.40 0.25 ased on 2 CZ 2 0.48 0.62 0.25	mize air lea  ≤ 1.  (vall area <sup>5</sup> , as defined  CZ 3  0.30  0.25  015 lgCC  CZ 3  0.44  0.57  0.25  CZ 3  0.027	/2-Lite 0.25 0.25 0.25 d by ANSI / F CZ 4 0.30 0.40 CZ 4 0.36 0.43 0.40	> 1/2-Lite CZ 0.30 0.25 EESNET / ICC Std. 3 CZ 4 C & 5 0.27 0.40 CZ 4 C & 5 0.36 0.43 0.40	71-3 1-3 01 CZ 6 0.27 0.40 CZ 6 0.34 0.41 0.40	void the 140  > 1/2-Lite (	CZ 8 0.27 0.40 CZ 8 0.28 0.35 0.40	
Skylights: Ceilings:	Wall Assembly U-Factor:  None  Area: Same as Rated Unit ², with door sea addition to measured airflow per ANSI / R Orientation: Same as Rated Unit ² 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 per Interior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Factor: 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: Construction Type: Vented with aperture = Radiant Barrier: None	O.064  al properly installe ESNET / ICC Std  Opaque 0.17 n/a thout exceeding a centage of area gy Rating Referer  CZ 1 0.40 0.25 tural) Windows b CZ 1 0.48 0.62 0.25  CZ 1 0.027  = 1sq. ft. per 300	vailable water Home  CZ 2 0.40 0.25 ased on 2 CZ 2 0.48 0.62 0.25  CZ 2 0.027 sq. ft. ceil	mize air lea  ≤ 1.  (vall area <sup>5</sup> , as defined  CZ 3  0.30  0.25  015 lgCC  CZ 3  0.44  0.57  0.25  CZ 3  0.027	/2-Lite 0.25 0.25 0.25 d by ANSI / F CZ 4 0.30 0.40 CZ 4 0.36 0.43 0.40	> 1/2-Lite CZ 0.30 0.25 EESNET / ICC Std. 3 CZ 4 C & 5 0.27 0.40 CZ 4 C & 5 0.36 0.43 0.40	71-3 1-3 01 CZ 6 0.27 0.40 CZ 6 0.34 0.41 0.40	void the 140  > 1/2-Lite (	CZ 8 0.27 0.40 CZ 8 0.28 0.35 0.40	
Isolated Sunrooms: Doors:  Glazing:  Skylights: Ceilings:	Wall Assembly U-Factor:  None  Area: Same as Rated Unit ², with door sea addition to measured airflow per ANSI / R Orientation: Same as Rated Unit ² 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 per Interior Shade Coefficient: Same as Energy External Shading: None Assembly U-Factors and SHGCs: Climate Zone: U-Factor: 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: Construction Type: Vented with aperture = Radiant Barrier: None Construction Type: Composition shingle of	O.064  al properly installe ESNET / ICC Std  Opaque 0.17 n/a thout exceeding a centage of area gy Rating Referer  CZ 1 0.40 0.25 tural) Windows b CZ 1 0.48 0.62 0.25  CZ 1 0.027  = 1sq. ft. per 300	vailable water Home  CZ 2 0.40 0.25 ased on 2 CZ 2 0.48 0.62 0.25  CZ 2 0.027 sq. ft. ceil	mize air lea  ≤ 1.  (vall area <sup>5</sup> , as defined  CZ 3  0.30  0.25  015 lgCC  CZ 3  0.44  0.57  0.25  CZ 3  0.027	/2-Lite 0.25 0.25 0.25 d by ANSI / F CZ 4 0.30 0.40 CZ 4 0.36 0.43 0.40	> 1/2-Lite CZ 0.30 0.25 EESNET / ICC Std. 3 CZ 4 C & 5 0.27 0.40 CZ 4 C & 5 0.36 0.43 0.40	71-3 1-3 01 CZ 6 0.27 0.40 CZ 6 0.34 0.41 0.40	void the 140  > 1/2-Lite (	CZ 8 0.27 0.40 CZ 8 0.28 0.35 0.40	
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# ENERGY STAR Multifamily New Construction, Version 1.1 (Rev. 01) Exhibit 1: Expanded ENERGY STAR Multifamily Reference Design Definition (Continued)

Heating			amily Refere								
	Heating capacity shall be selected in acco										
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 D										
	heat pump with a capacity that is equal to	the Reference De	sign heating load	divided by 4.2 C	OP and 2) a b	oiler with the b	palance of the	he			
	capacity of (1-1/4.2) or 76.19%										
	Fuel Type: Same as Rated Unit 2,6										
	System Type: Same as Rated Unit 2, exce	ept Reference Desi	ign shall be config	ured with air-so	urce heat pum	p in CZ 1-6 wł	nere Rated	Unit is			
	modeled with air-source or ground-source										
	with ground-source heat pump in CZ 7 & 8	8 where Rated Uni	t is modeled with a	air-source or gro	ound-source he	eat pump, elec	tric strip he	at or			
	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		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 <sub>t</sub> :	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		9.25	9.5	n/a	n/a			
	Air-Source Heat Pump Backup:	Electric	Electric Elect	ric 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-e	electric boilers, ser	ving the Rated Un	t and no other	units, the Electi	ric Auxiliary Er	nergy shall l	 be			
	determined in accordance with the method										
	determined in this Section. For non-electric										
	accordance with the methodology for the						20 4010.				
ooling	Cooling capacity shall be selected in acco						n in accord:	ance wi			
ystems:	ACCA Manual J, Eighth Edition, ASHRAE						11 111 4000141	arioc Wi			
otomo.	Fuel Type: Same as Rated Unit <sup>2, 6</sup>	Tranabook or r arr	damentalo, or arr	equivalent comp	diation proced	uio					
	System Type: Same as Rated Unit <sup>2</sup> , exce	ant Reference Des	ian shall he confid	ured with air-so	urce heat num	n in CZ 1-6 wh	nere Rated	I Init is			
	modeled with air-source or ground-source										
	with ground-source heat pump in CZ 7 & 8										
	electric baseboard heat; applicable efficie			all-source or giv	Juliu-Soulce He	at pump, elec	and suip ne	at, or			
	Climate Zone:			CZ 4	CZ 4 C & 5	CZ 6	CZ 7	CZ 8			
							13	13			
	AC SEER:	15 1	15 15	13	13	13		1.3			
	Air Causes Heat Dumm CEED.		1.5								
	Air-Source Heat Pump SEER:	15 1	15 15	15	15	15	n/a	n/a			
	Ground-Source Heat Pump EER:	15 1 n/a n	ı/a n/a	15 n/a	15 n/a	15 n/a	n/a 17.1	n/a 17.1			
	Ground-Source Heat Pump EER:  Where system type is a chiller or cooling t	15 1 n/a n ower with water-lo	n/a n/a op heat pumps, R	15 n/a eference Desig	15 n/a n SEER <sub>eq</sub> shall	15 n/a be determined	n/a 17.1 d in accorda	n/a 17.1 ance wit			
	Ground-Source Heat Pump EER:  Where system type is a chiller or cooling the methodology for the Rated Unit in AN:	15 1 n/a n ower with water-lo SI / RESNET / ICO	n/a n/a op heat pumps, R Std. 301, using m	15 n/a eference Desig notor efficiency	15 n/a n SEER <sub>eq</sub> shall of 0.85. For chi	15 n/a be determined llers, Reference	n/a 17.1 d in accorda ce Design S	n/a 17.1 ance wit			
	Ground-Source Heat Pump EER:  Where system type is a chiller or cooling t the methodology for the Rated Unit in ANs shall be determined using 0.78 kW/ton. For	15 1 n/a n nower with water-lo SI / RESNET / ICC or water-loop heat	n/a n/a op heat pumps, R Std. 301, using m pumps, Reference	15 n/a eference Desig notor efficiency e Design SEER	15 n/a n SEER <sub>eq</sub> shall of 0.85. For chi <sub>eq</sub> shall be deter	15 n/a be determined llers, Reference rmined using 2	n/a 17.1 d in accorda ce Design S 14 EER	n/a 17.1 ance wit SEER <sub>eq</sub>			
	Ground-Source Heat Pump EER:  Where system type is a chiller or cooling the methodology for the Rated Unit in ANshall be determined using 0.78 kW/ton. For Use (Gallons per Day): Same as Energy F	15 n/a n cower with water-lo SI / RESNET / ICC or water-loop heat Rating Reference H	n/a n/a op heat pumps, R Std. 301, using m pumps, Reference Home, as defined	15 n/a eference Desig notor efficiency Design SEER by ANSI / RESI	15 n/a n SEER <sub>eq</sub> shall of 0.85. For chi eq shall be deter NET / ICC Std.	15 n/a be determined llers, Reference rmined using 2	n/a 17.1 d in accorda ce Design S 14 EER	n/a 17.1 ance wit SEER <sub>eq</sub>			
ater ater	Ground-Source Heat Pump EER:  Where system type is a chiller or cooling the methodology for the Rated Unit in ANshall be determined using 0.78 kW/ton. For Use (Gallons per Day): Same as Energy Fresulting from the equipment specified in the spec	15 n/a n nower with water-lo SI / RESNET / ICC or water-loop heat Rating Reference heather Lighting, Applia	n/a n/a op heat pumps, R Std. 301, using m pumps, Reference Home, as defined ances, Fixtures & I	15 n/a eference Desig notor efficiency Design SEER by ANSI / RESI nternal Gains S	15 n/a n SEER <sub>eq</sub> shall of 0.85. For chi eg shall be deter NET / ICC Std. section <sup>9</sup>	15 n/a be determined llers, Reference rmined using 2	n/a 17.1 d in accorda ce Design S 14 EER	n/a 17.1 ance wit SEER <sub>eq</sub>			
ater eating	Ground-Source Heat Pump EER:  Where system type is a chiller or cooling the methodology for the Rated Unit in ANshall be determined using 0.78 kW/ton. For Use (Gallons per Day): Same as Energy Foresulting from the equipment specified in the Tank Temperature: Same as Energy Rational	15 n/a n nower with water-lo SI / RESNET / ICC or water-loop heat Rating Reference heat the Lighting, Applia	n/a n/a op heat pumps, R Std. 301, using m pumps, Reference Home, as defined ances, Fixtures & I ae, as defined by A	15 n/a eference Designotor efficiency Design SEER, Dy ANSI / RESN Internal Gains S	15 n/a n SEER <sub>eq</sub> shall of 0.85. For chi eq shall be deternous NET / ICC Std. dection 9 / ICC Std. 301	15 n/a be determined llers, Reference rmined using 2	n/a 17.1 d in accorda ce Design S 14 EER	n/a 17.1 ance wit SEER <sub>eq</sub>			
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ater eating	Ground-Source Heat Pump EER:  Where system type is a chiller or cooling the methodology for the Rated Unit in ANshall be determined using 0.78 kW/ton. For Use (Gallons per Day): Same as Energy Fresulting from the equipment specified in the Tank Temperature: Same as Energy Ratin Recirculation Pump Energy (for pumps see Recirculation Pump Energy (for pumps see	n/a n nower with water-lo SI / RESNET / ICC or water-loop heat Rating Reference heat the Lighting, Applia ng Reference Home erving the Rated Un erving the Rated Un	n/a n/a op heat pumps, R Std. 301, using m pumps, Reference Home, as defined ances, Fixtures & I ae, as defined by A nit and no other unit and other units	15 n/a eference Designotor efficiency Design SEER, Dy ANSI / RESN Internal Gains S INSI / RESNET Lits): 0 kWh per	15 n/a n SEER <sub>eq</sub> shall of 0.85. For chi eq shall be deterned NET / ICC Std. dection 9 / ICC Std. 301 year	15 n/a be determined llers, Referend rmined using 7 301, except fo	n/a 17.1 d in accorda ce Design S 14 EER or reduced u	n/a 17.1 ance wit SEER <sub>eq</sub> usage			
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## ENERGY STAR Multifamily New Construction, Version 1.1 (Rev. 01)

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

Infiltration &	Compartmentalization Rates: 0.3 cfm50/ft2 Enclosure Area, with Aext applied to calculate Infiltration Rate, in accordance with ANSI / RESNET /										
Mechanical	ICC Std. 301										
Ventilation:	Mechanical ventilation system without heat recovery										
	Rate: CFM = 0.01 * CFA + 7.5 * (Nbr + 1), where CFA = Conditioned Floor Area and Nbr = Number of Bedrooms; Runtime: 24 Hours / Day										
	Fan Watts: Watts = CFM Rate / 2.8 CFM per Watt, where CFM Rate is determined above										
	Climate Zone:	CZ 1	CZ 2	CZ 3	CZ 4	CZ 4 C & 5	CZ 6	CZ 7	CZ 8		
	Ventilation Type:	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	\$/kWh	AGC		\$/therm	CAP	N	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		g Reference Home, as									
Mass:	Additional mass specifically designed as a Thermal Storage Element for the Rated Unit shall be excluded										



#### 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, 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  $\geq$  0.70 (0.002 x Tank Gallon Capacity).

Revised 10/18/2019