



**BSR/ASHRAE/IES Addendum BN
to ANSI/ASHRAE/IES Standard 90.1-2016**

Public Review Draft

Proposed Addendum BN to Standard 90.1-2016, Energy Standard for Buildings Except Low-Rise Residential Buildings

**Second Public Review February 2019)
(Draft Shows Proposed Independent Substantive
Changes to Previous Public Review Draft)**

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FOREWORD

This addendum updates the table 6.8.1-4 to make the following changes;

- 1. Update the requirements for SPVAC <65,000 to the new DOE minimum efficiencies that go into effect on 9/23/2019*
- 2. Add the requirements specified by DOE for off mode power consumption of air cooled <65,000 Btu/h single phase central air conditioners and heat pumps to table F-1 and added a new definition to chapter 3.*
- 3. Move the requirements for room air conditioners for US ~~sales~~ applications to appendix F in a new table F-3 and update the requirements and metrics to the latest DOE values that went into effect on 6/1/2014.*
- 4. Update the room air conditioner requirements in the table 6.8.1-4 and indicate they are only for ~~sales~~ applications outside the US. Used the same values as defined by DOE for US ~~sales~~ applications as shown in table F-3*
- 5. Update the air cooled <65,000 Btu/h single phase central air conditioner and heat pump unit efficiencies in table F-1 to align with the DOE national efficiencies for this equipment category. This also includes conversion to the new SEER2, EER2 and HSPF2 metrics. The effective date for the new requirements is 1/1/2023 as specified by DOE requirements.*
- 6. Add a new definitions for efficiency metrics for room air conditioners to chapter 3 (CEER for IP units and CCOP_c for SI units) as specified in ANSI/AHAM RAC-1 2015 standard*
- 7. Added the reference test procedure to table F-1 and to the new table F-3*

The economic justification for the more stringent efficiency levels for air-cooled <65K single phase, room air conditioners, and SPVAC <65,000 was addressed in the DOE rulemaking documents for the applicable energy conservation standards rulemakings

The following 9 corrections and changes were made by the ISC to tables 6.8.1-4 and Table F-1.

1. The term “for sale outside the US” was changed to for “applications outside the US” and the term “for sale in the US” where changed to for “US applications”
2. A footnote e was added to table 6.8.1-4 to the Minimum Efficiency column to clarify that “Cap” in EER and COPH equations for PTACs and PTHPs means cooling capacity in Btu/h at 95 °F outdoor dry-bulb temperature. In the SI version of Table 6.8.1-4, a footnote should be added to the Minimum Efficiency

column to clarify that “Cap” in COPC and COPH equations for PTACs and PTHPs means cooling capacity in kW at 35 °C outdoor dry-bulb temperature.

3. In table 6.8.1-4 SI version some of the equations for PTAC’s were incorrectly converted and have been corrected
4. Footnote c in table 6.8.1-4 was incorrectly applied to heating operation and it only applies to cooling operation so this was corrected.
5. In table F-1 $P_{w,off}$ standards for all single phase units was added to requirements before 1/1/2023 as they went into effect on 1/1/2015
6. The minimum efficiency level for Room Air Conditioners without reverse cycle and without louvered sides for sale outside US with sizes between 14,000 and 20,000 Btu/h is mistakenly labeled as CEER3 instead of CEER in both IP and SI versions of Table 6.8.1-4.
7. In the SI Table 6.8.1-4, the standard for cooling mode SPVHPs between 40 and 70 kW should be 2.93 rather than 3.22. 2.93 COP_c is the correctly converted value from the corresponding 10.0 EER level for this equipment class in the IP table (and in DOE’s standards at 10 CFR 431.97).
8. The number of decimal places used in minimum efficiency levels for PTACs/PTHPs and SPVACs/SPVHPs in the IP version of table 6.8.1-4 should be consistent with the number of decimal places used in the Federal standards at 10 CFR 431.97. For example, in the IP version of Table 6.8.1-4 there is one decimal place in the minimum EER level for standard size PTACs <7,000 Btu/h, but two decimal places in the minimum EER level for standard size PTACs >15,000 Btu/h. Both of these levels should align with the corresponding Federal standards, which include only one decimal place.
9. In the IP Table F-1, there is a typo for the SEER2 standard for small-duct high-velocity systems. To align with Federal standards at 10 CFR 430.32, the minimum SEER2 level (after 1/1/2023) for the southeastern region should be 12.0, not 11.7.
10. For the size category in table 6.8.1-4 the “input” term is not needed and has been deleted

[Note to Reviewers: This public review draft makes proposed independent substantive changes to the previous public review draft. These changes are indicated in the text by underlining (for additions) and ~~striketrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the previous draft are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed substantive changes.]

Addendum BN to 90.1-2016

Make the following changes to the revised IP table 6.8.1-4

Table 6.8.1-4 Electrically Operated Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Single-Package Vertical Air Conditioners, Single-Package Vertical Heat Pumps, Room Air Conditioners, and Room Air Conditioner Heat Pumps—Minimum Efficiency Requirements

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency ^d	Test Procedure ^a
PTAC (cooling mode) standard size	<7,000 Btu/h	95°F db/75 °F wb outdoor air ^c	11.9 EER	AHRI 310/380
	≥7,000 Btu/h and ≤15,000 Btu/h		14.0 – (0.300 × Cap/1000) EER ^e	
	>15,000 Btu/h		9.50 EER	
PTAC (cooling mode) nonstandard size ^a	<7,000 Btu/h	95°F db/75 °F wb outdoor air ^c	9.40 EER	AHRI 310/380
	≥7,000 Btu/h and ≤15,000 Btu/h		10.9 – (0.213 × Cap/1000) EER ^e	
	>15,000 Btu/h		7.70 EER	
PTHP (cooling mode) standard size	<7,000 Btu/h	95°F db/75 °F wb outdoor air ^c	11.9 EER	AHRI 310/380
	≥7,000 Btu/h and ≤15,000 Btu/h		14.0 – (0.300 × Cap/1000) EER ^e	
	>15,000 Btu/h		9.50 EER	
PTHP (cooling mode) nonstandard size ^b	<7,000 Btu/h	95°F db/75 °F wb outdoor air ^c	9.30 EER	AHRI 310/380
	≥7,000 Btu/h and ≤15,000 Btu/h		10.8 – (0.213 × Cap/1000) EER ^e	
	>15,000 Btu/h		7.60 EER	
PTHP (heating mode) standard size	<7,000 Btu/h	47°F db/43°F wb outdoor air ^e	3.30 COP _H	AHRI 310/380
	≥7,000 Btu/h and ≤15,000 Btu/h		3.7 – (0.052 × Cap/1000) COP _H ^e	
	>15,000 Btu/h		2.90 COP _H	
PTHP (heating mode) nonstandard size ^b	<7,000 Btu/h	47°F db/43°F wb outdoor air ^e	2.70 COP _H	AHRI 310/380
	≥7,000 Btu/h and ≤15,000 Btu/h		2.9 – (0.026 × Cap/1000) COP _H ^e	
	>15,000 Btu/h		2.50 COP _H	
SPVAC (cooling mode) Single and 3 phase	<65,000 Btu/h	95°F db/75°F wb outdoor air ^c	11.0 EER	AHRI 390
	≥65,000 Btu/h and <135,000 Btu/h		10.0 EER	
	≥135,000 Btu/h and <240,000 Btu/h		10.0 EER	
SPVHP (cooling mode)	<65,000 Btu/h	95°F db/75°F wb outdoor air ^c	11.0 EER	AHRI 390
	≥65,000 Btu/h and <135,000 Btu/h		10.0 EER	
	≥135,000 Btu/h and <240,000 Btu/h		10.0 EER	
SPVHP (heating mode)	<65,000 Btu/h	47°F db/43°F wb outdoor air ^e	3.30 COP _H	AHRI 390
	≥65,000 Btu/h and <135,000 Btu/h		3.00 COP _H	
	≥135,000 Btu/h and <240,000 Btu/h		3.00 COP _H	
	<6,000 Btu/h		11.0 CEER	ANSI/AHAM

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Room Air Conditioners without reverse cycle with louvered sides for sale <u>application</u> outside US ^d	≥6,000 and <8,000 Btu/h		11.0 <i>CEER</i>	RAC-1
	8,000 and <14,000 Btu/h		10.9 <i>CEER</i>	
	14,000 and <20,000 Btu/h		10.7 <i>CEER</i>	
	≥20,000 and <28,000 Btu/h		9.4 <i>CEER</i>	
	≥28,000 Btu/h		9.0 <i>CEER</i>	
Room Air Conditioners without reverse cycle without louvered sides for sale <u>application</u> outside US ^d	<6,000 Btu/h		10.0 <i>CEER</i>	ANSI/AHAM RAC-1
	≥6,000 and <8,000 Btu/h		10.0 <i>CEER</i>	
	≥8,000 and <11,000 Btu/h		9.6 <i>CEER</i>	
	≥11,000 and <14,000 Btu/h		9.5 <i>CEER</i>	
	≥14,000 and <20,000 Btu/h		9.3 <i>CEER</i> ³	
	≥20,000 Btu/h		9.4 <i>CEER</i>	
Room Air Conditioners with reverse cycle, with louvered sides for sale <u>application</u> outside US ^d	<20,000 Btu/h		9.8 <i>CEER</i>	ANSI/AHAM RAC-1
	≥20,000 Btu/h		9.3 <i>CEER</i>	
Room Air Conditioners with reverse cycle without louvered sides for sale <u>application</u> outside US ^d	<14,000 Btu/h		9.3 <i>CEER</i>	ANSI/AHAM RAC-1
	≥14,000 Btu/h		8.7 <i>CEER</i>	ANSI/AHAM RAC-1
Room Air Conditioners, casement only for sale <u>application</u> outside US ^d	All		9.5 <i>CEER</i>	ANSI/AHAM RAC-1
Room Air Conditioners, casement slider for sale <u>application</u> outside US ^d	All		10.4 <i>CEER</i>	ANSI/AHAM RAC-1

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

b. Nonstandard size units must be factory *labeled* as follows: “MANUFACTURED FOR NONSTANDARD SIZE APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEW STANDARD PROJECTS.” Nonstandard size efficiencies apply only to units being installed in existing sleeves having an external *wal*/opening of less than 16 in. high or less than 42 in. wide and having a cross-sectional area less than 670 in².

c. The cooling-mode wet bulb temperature requirement only applies for units that reject condensate to the condenser coil.

d. Room air conditioners are regulated as consumer products by the US Department of Energy at 10 CFR 430. For US ~~sales~~ applications of Room air conditioners, refer to appendix F table F-3 for the U.S. Department of Energy minimum efficiency requirements for US applications.

e. Cap” in EER and COP_H equations for PTACs and PTHPs means cooling capacity in Btu/h at 95 °F outdoor dry-bulb temperature.

Modify the following table inserted in the first public review

Table F-1 Minimum *Efficiency* Requirements Single-Phase Central Air Conditioners and Heat Pumps for ~~sale~~ application in US

Product Class	Capacity Range	National Standards	Southeastern Region Standards ^a	Southwestern Region Standards ^b	Test Procedure ^f
Central Air Conditioners and Heat Pumps^{c,d}					
Split-System air conditioners for sale in the US <u>application</u>	<45,000 Btu/h single phase	before 1/1/2023 SEER = 13.0 <u>P_{w,OFF} ≤ 30 W</u>	before 1/1/2023 SEER = 14.0 <u>P_{w,OFF} ≤ 30 W</u>	before 1/1/2023 SEER = 14.0 EER=12.2 <u>P_{w,OFF} ≤ 30 W</u>	AHRI 210/240-2017 before 1/1/2023 AHRI 210/240-2023 after 1/1/2023
		after 1/1/2023 SEER2 = 13.4 P _{w,OFF} ≤ 30 W	after 1/1/2023 SEER2 = 14.3 P _{w,OFF} ≤ 30 W	after 1/1/2023 SEER2 = 14.3 P _{w,OFF} ≤ 30 W	
Split-system air conditioners	≥45,000 and <65,000 Btu/h single phase	before 1/1/2023 SEER = 13.0 <u>P_{w,OFF} ≤ 30 W</u>	before 1/1/2023 SEER = 14.0 <u>P_{w,OFF} ≤ 30 W</u>	before 1/1/2023 SEER = 14.0 EER =11.7 ^d <u>P_{w,OFF} ≤ 30 W</u>	AHRI 210/240-2017 before 1/1/2023 AHRI 210/240-2023 after 1/1/2023
		after 1/1/2023 SEER2 = 13.4 P _{w,OFF} ≤ 30 W	after 1/1/2023 SEER2 = 13.8 P _{w,OFF} ≤ 30 W	after 1/1/2023 SEER2 = 13.8 EER2=11.2/9.8 ^e P _{w,OFF} ≤ 30 W	
Split-System heat pumps	<65,000 Btu/h single phase	before 1/1/2023 SEER = 14.0 HSPF = 8.2 <u>P_{w,OFF} ≤ 33 W</u>	before 1/1/2023 SEER = 14.0 HSPF = 8.2 <u>P_{w,OFF} ≤ 33 W</u>	before 1/1/2023 SEER = 14.0 HSPF = 8.2 <u>P_{w,OFF} ≤ 33 W</u>	AHRI 210/240-2017 before 1/1/2023 AHRI 210/240-2023 after 1/1/2023
		after 1/1/2023 SEER2=14.3 HSPF2= 7.5 P _{w,OFF} ≤ 33 W	after 1/1/2023 SEER2=14.3 HSPF2=7.5 P _{w,OFF} ≤ 33 W	after 1/1/2023 SEER2=14.3 HSPF2=7.5 P _{w,OFF} ≤ 33 W	
Single-package air conditioners ^a	<65,000 Btu/h single phase	before 1/1/2023 SEER = 14.0 <u>P_{w,OFF} ≤ 30 W</u>	before 1/1/2023 SEER = 14.0 <u>P_{w,OFF} ≤ 30 W</u>	Before 1/1/2023 SEER = 14.0 EER = 11.0 <u>P_{w,OFF} ≤ 30 W</u>	AHRI 210/240-2017 before 1/1/2023 AHRI 210/240-2023 after 1/1/2023
		after 1/1/2023 SEER2=13.4 P _{w,OFF} ≤ 30 W	after 1/1/2023 SEER2 =13.4 P _{w,OFF} ≤ 30 W	after 1/1/2023 SEER2=13.4 EER2=10.6 P _{w,OFF} ≤ 30 W	
Single-package heat pumps	<65,000 Btu/h single phase	Before 1/1/2023 SEER = 14.0 HSPF = 8.0 <u>P_{w,OFF} ≤ 33 W</u>	Before 1/1/2023 SEER = 14.0 HSPF = 8.0 <u>P_{w,OFF} ≤ 33 W</u>	Before 1/1/2023 SEER = 14.0 HSPF = 8.0 <u>P_{w,OFF} ≤ 33 W</u>	AHRI 210/240-2017 before 1/1/2023 AHRI 210/240-2023 after 1/1/2023
		after 1/1/2023 SEER2=13.4 HSPF2=6.7 P _{w,OFF} ≤ 33 W	after 1/1/2023 SEER2=13.4 HSPF2=6.7 P _{w,OFF} ≤ 33 W	after 1/1/2023 SEER2=13.4 HSPF2=6.7 P _{w,OFF} ≤ 33 W	
Small-duct high-velocity systems	<65,000 Btu/h single phase	Before 1/1/2023 SEER = 12.0 HSPF = 7.2 <u>P_{w,OFF} ≤ 30 W</u>	Before 1/1/2023 SEER = 12.0 HSPF = 7.2 <u>P_{w,OFF} ≤ 30 W</u>	Before 1/1/2023 SEER = 12.0 HSPF = 7.2 <u>P_{w,OFF} ≤ 30 W</u>	AHRI 210/240-2017 before 1/1/2023

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		After 1/1/2023 SEER2=12.0 HSPF2=6.1 $P_{w,OFF} \leq 30 \text{ W}$	After 1/1/2023 SEER2= 11.7 <u>12.0</u> HSPF2=6.1 $P_{w,OFF} \leq 30 \text{ W}$	After 1/1/2023 SEER2=12.0 HSPF2=6.1 $P_{w,OFF} \leq 30 \text{ W}$	AHRI 210/240-2023 after 1/1/2023
Space-constrained products—air conditioners ^a	<65,000 Btu/h <i>single phase</i>	Before 1/1/2023 SEER = 12.0 $P_{w,OFF} \leq 30 \text{ W}$	Before 1/1/2023 SEER = 12.0 $P_{w,OFF} \leq 30 \text{ W}$	Before 1/1/2023 SEER = 12.0 $P_{w,OFF} \leq 30 \text{ W}$	AHRI 210/240-2017 before 1/1/2023
		After 1/1/2023 SEER2= 11.7 $P_{w,OFF} \leq 30 \text{ W}$	After 1/1/2023 SEER2= 11.7 $P_{w,OFF} \leq 30 \text{ W}$	After 1/1/2023 SEER2= 11.7 $P_{w,OFF} \leq 30 \text{ W}$	AHRI 210/240-2023 after 1/1/2023
Space-constrained products—heat pumps ^a	<65,000 Btu/h <i>single phase</i>	Before 1/1/2023 SEER = 12.0 HSPF = 7.4 $P_{w,OFF} \leq 33 \text{ W}$	Before 1/1/2023 SEER = 12.0 HSPF = 7.4 $P_{w,OFF} \leq 33 \text{ W}$	Before 1/1/2023 SEER = 12.0 HSPF = 7.4 $P_{w,OFF} \leq 33 \text{ W}$	AHRI 210/240-2017 before 1/1/2023
		After 1/1/2023 SEER2 = 11.9 HSPF2 = 6.3 $P_{w,OFF} \leq 33 \text{ W}$	After 1/1/2023 SEER2 = 11.9 HSPF2 = 6.3 $P_{w,OFF} \leq 33 \text{ W}$	After 1/1/2023 SEER2 = 11.9 HSPF2 = 6.3 $P_{w,OFF} \leq 33 \text{ W}$	AHRI 210/240-2023 after 1/1/2023

- a. The Southeastern region for central air conditioners and heat pumps contains the following States: Alabama, Arkansas, Delaware, Florida, Georgia, Hawaii, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia, and the District of Columbia.
- b. The Southwestern region for central air conditioners and heat pumps contains the States of Arizona, California, Nevada, and New Mexico.
- c. SEER is Seasonal Energy Efficiency Ratio; EER is Energy Efficiency Ratio; HSPF is Heating Seasonal Performance Factor; and Btu/h is British thermal units per hour. SEER2 is Seasonal Energy Efficiency Ratio reflecting the new higher static that is effective 1/1/2023; EER2 is Energy Efficiency Ratio also reflecting the higher static; HSPF2 is new Heating Seasonal Performance Factor reflecting the new higher static and load line. Test and rating procedure defined in AHRI 210/240-2017 for EER, SEER and HSPF and AHRI210/240 for EER2, SEER2 and HSPF2
- d. The 11.7 EER2 standard applies to products with a certified SEER2 less than 15.2. The 9.8 EER2 standard applies to products with a certified SEER2 greater than or equal to 15.2.
- e. The 11.2 EER2 standard applies to products with a certified SEER2 less than 15.2. The 9.8 EER2 standard applies to products with a certified SEER2 greater than or equal to 15.2.
- f. Section 12 contains a complete specification of the referenced test procedures, including the referenced year version of the test procedure

Note to Reviewer: No changes were made by the ISC to new IP table F-3

Table F-3 Minimum *Efficiency* Requirements for Room Air Conditioners for Sale in US applications:

Product Class	Capacity Range	Efficiency Requirements ^a	Test Procedure ^b
Room Air Conditioners without reverse cycle with louvered sides	<6,000 Btu/h	CEER= 11.0	10 CFR 430 Appendix F
	≥6,000 and <8,000 Btu/h	CEER= 11.0	
	≥8,000 and <14,000 Btu/h	CEER= 10.9	
	≥14,000 and <20,000 Btu/h	CEER= 10.7	
	≥20,000 and <28,000 Btu/h	CEER= 9.4	
Room Air Conditioners without reverse cycle without louvered sides	≥28,000	CEER= 9.0	10 CFR 430 Appendix F
	<6,000 Btu/h	CEER=10.0	
	≥6,000 and <8,000 Btu/h	CEER=10.0	
	≥8,000 and <11,000 Btu/h	CEER=9.6	
	≥11,000 and <14,000 Btu/h	CEER=9.5	
Room Air Conditioners with reverse cycle, with louvered sides	≥14,000 and <20,000 Btu/h	CEER=9.3	10 CFR 430 Appendix F
	≥20,000 Btu/h	CEER=9.4	
Room Air Conditioners with reverse cycle without louvered sides	<20,000 Btu/h	CEER=9.8	10 CFR 430 Appendix F
	≥20,000 Btu/h	CEER=9.3	
Room Air Conditioners, casement only	<14,000 Btu/h	CEER=9.3	10 CFR 430 Appendix F
	≥14,000 Btu/h	CEER=8.7	
Room Air Conditioners, casement slider	All	CEER=9.5	10 CFR 430 Appendix F
Room Air Conditioners, casement slider	All	CEER=10.4	10 CFR 430 Appendix F

a. Source: Federal Register 76 FR 37431, June 27, 2011

b. Section 12 contains a complete specification of the referenced test procedures,

Make ISC modifications to the SI table 6.8.1-4

Table 6.8.1-4 Electrically Operated Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Single-Package Vertical Air Conditioners, Single-Package Vertical Heat Pumps, Room Air Conditioners, and Room Air Conditioner Heat Pumps—Minimum Efficiency Requirements

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency^d	Test Procedure^a
PTAC (cooling mode) standard size	<2.1 kW	35°C db/23.9 °C wb outdoor air ^c	3.49 COP _c	AHRI 310/380
	≥2.1 kW and ≤4.4 kW		4.10 – (0.2900.300 × Cap) COP _c ^e	
	>4.4 kW		2.78 COP _c	
PTAC (cooling mode) nonstandard size ^a	<2.1 kW	35°C db/23.9 °C wb outdoor air ^c	2.75 COP _c	AHRI 310/380
	≥2.1 kW and ≤4.4 kW		3.19 – (0.2060.213 × Cap) COP _c ^e	
	>4.4 kW		2.26 COP _c	
PTHP (cooling mode) standard size	<2.1 kW	35°C db/23.9 °C wb outdoor air ^c	3.49 COP _c	AHRI 310/380
	≥2.1 kW and ≤4.4 kW		4.10 – (0.2900.300 × Cap) COP _c ^e	
	>4.4 kW		2.78 COP _c	
PTHP (cooling mode) nonstandard size ^b	<2.1 kW	35°C db/23.9 °C wb outdoor air ^c	2.73 COP _c	AHRI 310/380
	≥2.1 kW and ≤4.4 kW		3.17 – (0.2060.213 × Cap) COP _c ^e	
	>4.4 kW		2.23 COP _c	
PTHP (heating mode) standard size	<2.1 kW	8.3°C db/6.1 °C wb outdoor air ^e	3.30 COP _H	AHRI 310/380
	≥2.1 kW and ≤4.4 kW		3.7 – (0.0500.177 × Cap) COP _H ^e	
	>4.4 kW		2.90 COP _H	
PTHP (heating mode) nonstandard size ^b	<2.1 kW	8.3°C db/6.1 °C wb outdoor air ^e	2.70 COP _H	AHRI 310/380
	≥2.1 kW and ≤4.4 kW		2.9 – (0.0250.089 × Cap) COP _H ^e	
	>4.4 kW		2.50 COP _H	
SPVAC (cooling mode) Single and 3 phase	<19 kW	35°C db/23.9°C wb outdoor air ^c	3.22 COP _c	AHRI 390
	≥19 kW and <40 kW		2.93 COP _c	
	≥40 kW and <70 kW		2.93 COP _c	
SPVHP (cooling mode)	<19 kW	35°C db/23.9°C wb outdoor air ^c	3.22 COP _c	AHRI 390
	≥19 kW and <40 kW		2.93 COP _c	
	≥40 kW and <70 kW		3.22 2.93 COP _c	
SPVHP (heating mode)	<19 kW	8.3°C db/6.1°C wb outdoor air ^e	3.3 COP _H	AHRI 390
	≥19 kW and <40 kW		3.0 COP _H	
	≥40 kW and <70 kW		3.0 COP _H	
Room Air Conditioners without reverse cycle with louvered sides for sale applications outside the US ^d	<1.8 kW		CCOP _c = 3.22	ANSI/AHAM RAC-1
	≥1.8 and <2.3 kW		CCOP _c = 3.19	
	≥2.3 and <4.1 kW		CCOP _c = 3.19	

	≥4.1 and <5.9 kW		$CCOP_c = 3.14$	
	≥5.9 kW and <8.2 kW		$CCOP_c = 2.75$	
	≥8.2 kW		$CCOP_c = 2.64$	
Room Air Conditioners without reverse cycle without louvered sides for <u>sale applications</u> outside the US ^d	<1.8 kW		$CCOP_c = 2.93$	ANSI/AHAM RAC-1
	≥1.8 and <2.3 kW		$CCOP_c = 2.93$	
	≥2.3 and <3.2 kW		$CCOP_c = 2.81$	
	≥3.2 and <3.2 kW		$CCOP_c = 2.78$	
	≥4.1 and <5.9 kW		$CCOP_c = 2.73$	
	≥5.9 kW		$CCOP_c = 2.75$	
Room Air Conditioners with reverse cycle, with louvered sides for <u>sale applications</u> outside the US ^d	<5.9 kW		$CCOP_c = 2.87$	ANSI/AHAM RAC-1
	≥5.9 kW		$CCOP_c = 2.73$	
Room Air Conditioners with reverse cycle without louvered sides for <u>sale applications</u> outside the US ^d	<4.1 kW		$CCOP_c = 2.73$	ANSI/AHAM RAC-1
	≥4.1 kW		$CCOP_c = 2.55$	ANSI/AHAM RAC-1
Room Air Conditioners, casement only for <u>sale applications</u> outside the US ^d	All		$CCOP_c = 2.78$	ANSI/AHAM RAC-1
Room Air Conditioners, casement slider for <u>sale applications</u> outside the US ^d	All		$CCOP_c = 3.05$	ANSI/AHAM RAC-1

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

b. Nonstandard size units must be factory *labeled* as follows: “MANUFACTURED FOR NONSTANDARD SIZE APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEW STANDARD PROJECTS.” Nonstandard size efficiencies apply only to units being installed in existing sleeves having an external *wall* opening of less than 0.45 m. high or less than 1.0 m. wide and having a cross-sectional area less than 0.4 m².

c. The cooling mode wet bulb temperature requirement only applies for units that reject condensate to the condenser coil.

d. Room air conditioners are regulated as consumer products by the US Department of Energy at 10 CFR 430. For US sales applications of room air conditioners, refer to appendix F table F-3 for the U.S. Department of Energy minimum efficiency requirements.

e. “Cap” in COP_c and COP_H equations for PTACs and PTHPs means cooling capacity in kW at 35 °C outdoor dry-bulb temperature.

Make the following ISC modifications to the table F-1 in the SI Standard

Table F-1 Minimum *Efficiency* Requirements for Single-Phase Central Air Conditioners and Heat Pumps sold in the US:

Product Class	Capacity Range	National Standards	Southeastern Region Standards ^a	Southwestern Region Standards ^b	Test Procedure ^f
Central Air Conditioners and Heat Pumps^{cd}					
Split-system air conditioners	<13 kW <i>single phase</i>	before 1/1/2023 SCOP _C = 3.81 <u>P_{w,OFF} ≤ 30 W</u>	before 1/1/2023 SCOP _C = 4.10 <u>P_{w,OFF} ≤ 30 W</u>	before 1/1/2023 SCOP _C = 4.10 COP _C =3.58 <u>P_{w,OFF} ≤ 30 W</u>	AHRI 210/240-2017 before 1/1/2023
		after 1/1/2023 SCOP _{2C} =3.93 P _{w,OFF} ≤ 30 W	after 1/1/2023 SCOP _{2C} = 4.19 P _{w,OFF} ≤ 30 W	after 1/1/2023 SCOP _{2C} = 4.19 COP _{2C} =3.43/2.87 ^d P _{w,OFF} ≤ 30 W	AHRI 210/240-2023 after 1/1/2023
Split-system air conditioners	≥13 kW and <19 kW <i>single phase</i>	before 1/1/2023 SCOP _C = 3.81 <u>P_{w,OFF} ≤ 30 W</u>	before 1/1/2023 SCOP _C = 4.10 <u>P_{w,OFF} ≤ 30 W</u>	before 1/1/2023 SCOP _C = 4.10 COP _C =3.43 ^d <u>P_{w,OFF} ≤ 30 W</u>	AHRI 210/240-2017 before 1/1/2023
		after 1/1/2023 SCOP _{2C} =3.93 P _{w,OFF} ≤ 30 W	after 1/1/2023 SCOP _{2C} = 4.19 P _{w,OFF} ≤ 30 W	after 1/1/2023 SCOP _{2C} =4.04 COP _{2C} =3.2.8/2.87 ^d P _{w,OFF} ≤ 30 W	AHRI 210/240-2023 after 1/1/2023
Split-System heat pumps	<19 kW <i>single phase</i>	before 1/1/2023 SCOP _C = 4.10 SCOP _H = 2.40 <u>P_{w,OFF} ≤ 33 W</u>	before 1/1/2023 SCOP _C = 4.10 SCOP _H = 2.40 <u>P_{w,OFF} ≤ 33 W</u>	before 1/1/2023 SCOP _C = 4.10 SCOP _H = 2.40 <u>P_{w,OFF} ≤ 33 W</u>	AHRI 210/240-2017 before 1/1/2023
		after 1/1/2023 SCOP _{2C} =4.19 SCOP _{2H} = 2.20 P _{w,OFF} ≤ 33 W	after 1/1/2023 SCOP _{2C} =4.19 SCOP _{2H} =2.20 P _{w,OFF} ≤ 33 W	after 1/1/2023 SCOP _{2C} =4.19 SCOP _{2H} =2.20 P _{w,OFF} ≤ 33 W	AHRI 210/240-2023 after 1/1/2023
Single-Package air conditioners ^a	<19 kW <i>single phase</i>	before 1/1/2023 SCOP _C = 4.10 <u>P_{w,OFF} ≤ 30 W</u>	before 1/1/2023 SCOP _C = 4.10 <u>P_{w,OFF} ≤ 30 W</u>	Before 1/1/2023 SCOP _C = 4.10 COP _C = 3.22 <u>P_{w,OFF} ≤ 30 W</u>	AHRI 210/240-2017 before 1/1/2023
		after 1/1/2023 SCOP _{2C} =3.93 P _{w,OFF} ≤ 30 W	after 1/1/2023 SCOP _{2C} =3.93 P _{w,OFF} ≤ 30 W	after 1/1/2023 SCOP _{2C} =3.93 COP _{2C} =3.11 P _{w,OFF} ≤ 30 W	AHRI 210/240-2023 after 1/1/2023
Single-package heat pumps	<19 kW <i>single phase</i>	Before 1/1/2023 SCOP _C = 4.10 SCOP _H = 2.34 <u>P_{w,OFF} ≤ 33 W</u>	Before 1/1/2023 SCOP _C = 4.10 SCOP _H = 2.34 <u>P_{w,OFF} ≤ 33 W</u>	Before 1/1/2023 SCOP _C = 4.10 SCOP _H = 2.34 <u>P_{w,OFF} ≤ 33 W</u>	AHRI 210/240-2017 before 1/1/2023
		after 1/1/2023 SCOP _{2C} =3.93 SCOP _{2H} =1.96 P _{w,OFF} ≤ 33 W	after 1/1/2023 SCOP _{2C} =3.93 SCOP _{2H} =1.96 P _{w,OFF} ≤ 33 W	after 1/1/2023 SCOP _{2C} =3.93 SCOP _{2H} =1.96 P _{w,OFF} ≤ 33 W	AHRI 210/240-2023 after 1/1/2023
Small-duct high-velocity systems	<19 kW <i>single phase</i>	Before 1/1/2023 SCOP _C = 3.52 SCOP _H = 2.11 <u>P_{w,OFF} ≤ 30 W</u>	Before 1/1/2023 SCOP _C = 3.52 SCOP _H = 2.11 <u>P_{w,OFF} ≤ 30 W</u>	Before 1/1/2023 SCOP _C = 3.52 SCOP _H = 2.11 <u>P_{w,OFF} ≤ 30 W</u>	AHRI 210/240-2017 before 1/1/2023
		After 1/1/2023 SCOP _{2C} =3.52 SCOP _{2H} =1.79 P _{w,OFF} ≤ 30 W	After 1/1/2023 SCOP _{2C} =3.52 SCOP _{2H} =1.79 P _{w,OFF} ≤ 30 W	After 1/1/2023 SCOP _{2C} =3.52 SCOP _{2H} =1.79 P _{w,OFF} ≤ 30 W	AHRI 210/240-2023 after 1/1/2023

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Space-constrained products—air conditioners ^a	<19 kW <i>single phase</i>	Before 1/1/2023 $SCOP_C = 3.52$ $P_{w,OFF} \leq 30\text{ W}$	Before 1/1/2023 $SCOP_C = 3.52$ $P_{w,OFF} \leq 30\text{ W}$	Before 1/1/2023 $SCOP_C = 3.52$ $P_{w,OFF} \leq 30\text{ W}$	AHRI 210/240-2017 before 1/1/2023
		After 1/1/2023 $SCOP_{C2} = 3.43$ $P_{w,OFF} \leq 30\text{ W}$	After 1/1/2023 $SCOP_C = 3.43$ $P_{w,OFF} \leq 30\text{ W}$	After 1/1/2023 $SCOP_{2C} = 3.43$ $P_{w,OFF} \leq 30\text{ W}$	AHRI 210/240-2023 after 1/1/2023

Space-constrained products—heat pumps ^a	<19 kW <i>single phase</i>	Before 1/1/2023 $SCOP_C = 3.52$ $SCOP_H = 2.17$ $P_{w,OFF} \leq 33\text{ W}$	Before 1/1/2023 $SCOP_C = 3.52$ $SCOP_H = 2.17$ $P_{w,OFF} \leq 33\text{ W}$	Before 1/1/2023 $SCOP_C = 3.52$ $SCOP_H = 2.17$ $P_{w,OFF} \leq 33\text{ W}$	AHRI 210/240-2017 before 1/1/2023
		After 1/1/2023 $SCOP_{2C} = 3.49$ $SCOP_{2H} = 1.85$ $P_{w,OFF} \leq 33\text{ W}$	After 1/1/2023 $SCOP_{2C} = 3.49$ $SCOP_{2H} = 6.3$ $P_{w,OFF} \leq 33\text{ W}$	After 1/1/2023 $SCOP_{2C} = 3.49$ $SCOP_{2H} = 1.85$ $P_{w,OFF} \leq 33\text{ W}$	AHRI 210/240-2023 after 1/1/2023

- a. The Southeastern region for central air conditioners and heat pumps contains the following States: Alabama, Arkansas, Delaware, Florida, Georgia, Hawaii, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia, and the District of Columbia.
- b. The Southwestern region for central air conditioners and heat pumps contains the States of Arizona, California, Nevada, and New Mexico.
- c. $SCOP_C$ is the metric version in W/W for the SEER is Seasonal Energy Efficiency Ratio; COP_C is the full load Efficiency which is the metric version of EER in W/W; $SCOP_H$ is the metric version in W/W of HSPF is Heating Seasonal Performance Factor. $SCOP_{2C}$ is the metric version in W/W for the SEER2 Seasonal Energy Efficiency Ratio; COP_{2C} is the full load Efficiency which is the metric version in W/W of EER2; $SCOP_{2H}$ is the metric version in W/W of HSPF2 which is Heating Seasonal Performance Factor. Test and rating procedures are defined in 10 CFR 430 Appendix M for EER, SEER, and HSPF and 10 CFR 430 Appendix M1 for EER2, SEER2 and HSPF2. The added “2” in the metric names reflects the new higher static (all metrics) and load line (HSPF2/ $SCOP_{2H}$ only) for the new metrics effective in 1/1/2023.
- d. The 3.43 COP_{2C} standard applies to products with a certified $SCOP_{2C}$ less than 4.45. The 2.87 COP_{2C} standard applies to products with a certified $SCOP_{2C}$ greater than or equal to 4.45.
- e. The 3.28 COP_{2C} standard applies to products with a certified $SCOP_{2C}$ less than 4.45. The 9.8 COP_{2C} standard applies to products with a certified $SCOP_{2C}$ greater than or equal to 4.45.
- f. Section 12 contains a complete specification of the referenced test procedures, including the referenced year version of the test procedure

Note to Reviewer: No ISC changes were made to the table F-3 SI version for the Room Air Conditioner Requirements that were moved and update from table 6.8.1-4 in the first public review.

Table F-3 Minimum *Efficiency* Requirements for Room Air Conditioners:

Product Class	Capacity Range	Efficiency Requirements ^a	Test Procedure ^b
Room Air Conditioners without reverse cycle with louvered sides	<1.8 kW	$CCOP_C = 3.22$	10 CFR 430 Appendix F
	≥1.8 and <2.3 kW	$CCOP_C = 3.19$	
	≥2.3 and <4.1 kW	$CCOP_C = 3.19$	
	≥4.1 and <5.9 kW	$CCOP_C = 3.14$	
	≥5.9 kW and <8.2 kW	$CCOP_C = 2.75$	
	≥8.2 kW	$CCOP_C = 2.64$	
Room Air Conditioners without reverse cycle without louvered sides	<1.8 kW	$CCOP_C = 2.93$	10 CFR 430 Appendix F
	≥1.8 and <2.3 kW	$CCOP_C = 2.93$	
	≥2.3 and <3.2 kW	$CCOP_C = 2.81$	
	≥3.2 and <3.2 kW	$CCOP_C = 2.78$	
	≥4.1 and <5.9 kW	$CCOP_C = 2.73$	
	≥5.9 kW	$CCOP_C = 2.75$	
Room Air Conditioners with reverse cycle, with louvered sides	<5.9 kW	$CCOP_C = 2.87$	10 CFR 430 Appendix F
	≥5.9 kW	$CCOP_C = 2.73$	
Room Air Conditioners with reverse cycle without louvered sides	<4.1 kW	$CCOP_C = 2.73$	10 CFR 430 Appendix F
Room Air Conditioners with reverse cycle	≥4.1 kW	$CCOP_C = 2.55$	10 CFR 430 Appendix F
Room Air Conditioners, casement only	All	$CCOP_C = 2.78$	10 CFR 430 Appendix F
Room Air Conditioners, casement slider	All	$CCOP_C = 3.05$	10 CFR 430 Appendix F

a. Source: Federal Register 76 FR 37431, June 27, 2011

b. Section 12 contains a complete specification of the referenced test procedures,