BSR/ASHRAE/IES Addendum ae
to ANSI/ASHRAE/IES Standard 90.1-2022

Public Review Draft

Proposed Addendum ae to Standard 90.1-2022, Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings

Second Public Review (April 2025)
(Draft Shows Proposed Independent Substantive Changes to Previous Public Review Draft)

This draft has been recommended for public review by the responsible project committee. To submit a comment on this proposed standard, go to the ASHRAE website at www.ashrae.org/standards-research--technology/public-review-drafts and access the online comment database. The draft is subject to modification until it is approved for publication by the Board of Directors and ANSI. Until this time, the current edition of the standard (as modified by any published addenda on the ASHRAE website) remains in effect. The current edition of any standard may be purchased from the ASHRAE Online Store at www.ashrae.org/bookstore or by calling 404-636-8400 or 1-800-727-4723 (for orders in the U.S. or Canada).

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FOREWORD

This addendum second public review ISC corrects some errors in numbers that were identified by comments from the first public review.

- Some numbers were incorrectly shown for the condensing unit only ratings for EER2 and IVEC values in table 6.8.1-1
- Some values were incorrectly shown in table 6.8.1-2 for Heat Pumps
- Note c of the heat pump table has been clarified to required $COP2_{H5}$ for cold climates
- Corrections to some SI values that were missed for converting from IP

[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 ~~strikethrough~~ (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. For the complete addendum please refer to the 1st full public review of Addendum ae.]

All comments should be submitted through the ASHRAE online comment data base.

My Comments (ashrae.org)

Comments should comply with the following;

- ***Be marked as supportive or non-supportive***
- ***Be specific to the text, section or table that is the subject of the comment***
- ***Where possible proposed alternate language or requirements including justification***
- ***Provide supporting information if needed***
- ***Comments should be submitted during the comment period***
- ***Only text marked as underlined, or strikeout are open for comments.***

Do not use the following comment submittal approach;

- ***Do not submit comments by email or other systems***
- ***Comments should be on a single topic and do not submit multiple comments in one comment. If you have multiple comments submit multiple comments in the on-line system***
- ***Attachments can be used for additional backup, but comments should be entered into the system***

Addendum ae to 90.1-2022

Make the following changes to IP table 6.8.1-1. Only items that changes are show and full table can be found in the first public review.

Table 6.8.1-1 Electrically Operated Unitary Air Conditioners and Condensing Units – Minimum Efficiency requirements (I-P)

Equipment Type	Size Category	Heating Section Type	Subcategory	Minimum Efficiency[g]	Test Procedure[a]
Air-Cooled *Condensing Unit* ≥135,000 Btu/h					
Condensing units air-Cooled	≥240,000 Btu/h and <760,000 Btu/h	All	All U.S. and outside U.S. applications	10.5 *EER*, 11.8 *IEER* before 1/1/2029 ~~10.0~~ 9.2 *EER2*, ~~13.3~~ 12.9 *IVEC* on or after 1/1/2029	AHRI 365 before 1/1/2029 AHRI 1365 on or after 1/1/2029
	≥760,000 Btu/h	All	All U.S. and outside U.S. applications	10.5 *EER*, 11.8 *IEER* before 1/1/2029 ~~8.7~~ 8.9 *EER2*, ~~11.0~~ 11.7 *IVEC* on or after 1/1/2029	

Make the following changes to IP table 6.8.1-2. Only items that changes are show and full table can be found in the first public review.

Table 6.8.1-2 Electrically Operated Air Source Unitary Heat Pumps – Minimum Efficiency requirements (I-P)

Equipment Type	Size Category	Heating Section Type	Subcategory	Minimum Efficiency [d]	Test Procedure[a]
HP Air-Source Three-Phase Air Cooled Double Duct Air Conditioners					
Double Duct air-source HP air conditioners Air conditioners [e]	≥65,000 Btu/h and <135,000 Btu/h	All other including dual fuel heat pumps [f]	All U.S. and outside U.S. applications	10.8 *EER*, 3.30 COP_{H47} before 1/1/2029 9.7 *EER2*, 14.0 *IVEC* 2.06 $COP2_{H17}$, 1.65 $COP2_{H5}$ [c] 5.98 *IVHE*, ~~5.70~~ 5.67 $IVHE_C$ [c] on or after 1/1/2029	AHRI 340/360 before 1/1/2029 AHRI 1340 on or after 1/1/2029
	≥135,000 Btu/h and <240,000 Btu/h	All other including dual fuel heat pumps [f]	All U.S. and outside U.S. applications	10.4 *EER* 3.30 COP_{H47} before 1/1/2029 9.1 *EER2*, 13.5 *IVEC* 1.89 $COP2_{H17}$, 1.45 $COP2_{H5}$ [c] 5.72 *IVHE*, 5.44 $IVHE_C$ [c] on or after 1/1/2029	
	≥240,000 Btu/h and < 300,000 Btu/h	All other including dual fuel heat pumps [f]	All U.S. and outside U.S. applications	9.3 *EER* 3.20 COP_{H47} before 1/1/2029 7.8 *EER2*, 12.8 *IVEC* 1.88 $COP2_{H17}$, 1.47 $COP2_{H5}$ [c] 5.47 *IVHE*, ~~5.19~~ 5.16 $IVHE_C$ [c] on or after 1/1/2029	
HP Air-Source Unitary Three-Phase Air Cooled Air Conditioners					
Split-*Systems* and Single-Package air-cooled Air conditioners	≥65,000 Btu/h and <135,000 Btu/h	All other including dual fuel heat pumps [f]	All U.S. and outside U.S. applications	10.8 *EER*, 13.9 *IEER* 3.40 COP_{H47}, 2.25 COP_{H17} before 1/1/2029 10.2 *EER2* 13.4 *IVEC*, 2.20 $COP2_{H17}$, 1.76 $COP2_{H5}$ [c] 6.20 *IVHE*, ~~5.92~~ 5.89 $IVHE_C$ [c] on or after 1/1/2029	AHRI 340/360 before 1/1/2029 AHRI 1340 on or after 1/1/2029
	≥135,000 Btu/h and <240,000 Btu/h	All other including dual fuel heat pumps [f]	All U.S. and outside U.S. applications	~~9.7~~10.4 *EER*, 13.3 *IEER* 3.30 COP_{H47} 2.05 COP_{H17} before 1/1/2029 ~~10.0~~ 9.7 *EER2*, 13.1 *IVEC*, 1.99 $COP2_{H17}$, 1.52 $COP2_{H5}$ [c] 6.00 *IVHE*, ~~5.71~~ 5.68 $IVHE_C$ [c] on or after 1/1/2029	

	≥240,000 Btu/h and <760,000 Btu/h	All other including dual fuel heat pumps [f]	All U.S. and outside U.S. applications	9.3 *EER*, 12.3 *IEER* 3.20 $COP_{H47,}$ 2.05 COP_{H17} before 1/1/2029 8.6 *EER2* 12.1 *IVEC* 1.98 $COP_{H17,}$ 1.55 $COP2_{H5}$ [c] 5.80 *IVHE,* ~~5.71~~ 5.68 $IVHE_C$ [c] on or after 1/1/2029	
	≥760,000 Btu/h	All other including dual fuel heat pumps [f]	All U.S. and outside U.S. applications	9.3 *EER*, 10.4 *IEER* 3.20 $COP_{H47,}$ 2.05 COP_{H17} before 1/1/2029 8.6 *EER2* 11.7 *IVEC* 1.98 $COP_{H17,}$ 1.55 $COP2_{H5}$ [c] 5.80 *IVHE,* ~~5.52~~ 5.49 $IVHE_C$ [c] on or after 1/1/2029	
HP Air-Source Air-Cooled *Condensing Unit* ≥135,000 Btu/h					
HP *Condensing units* air-source	≥135,000 Btu/h and <240,000 Btu/h	All	All U.S. and outside U.S. applications	No requirements before 1/1/2029 9.9 *EER2,* ~~13.8~~ 13.1 *IVEC* 1.99 $COP2_{H17,}$ 1.52 $COP2_{H5}$ [c] 6.00 *IVHE,* ~~5.71~~ 5.68 $IVHE_C$ [c] on or after 1/1/2029	AHRI 365 before 1/1/2029 AHRI 1365 on or after 1/1/2029
	≥240,000 Btu/h and <760,000 Btu/h	All	All U.S. and outside U.S. applications	No requirements before 1/1/2029 8.8 *EER2* ~~12.9~~ 12.1 *IVEC* 1.98 $COP2_{H17,}$ 1.55 $COP2_{H5}$ [c] 5.80 *IVHE,* ~~5.71~~ 5.68 $IVHE_C$ [c] on or after 1/1/2029	
	≥760,000 Btu/h	All	All U.S. and outside U.S. applications	No requirements before 1/1/2029 8.8 *EER2* 11.7 *IVEC* 1.98 $COP_{H17,}$ 1.55 $COP2_{H5}$ [c] 5.80 *IVHE,* ~~5.52~~ 5.49 $IVHE_C$ [c] on or after 1/1/2029	

c For heating efficiency requirement compliance with $COP2_{H17}$ and *IVHE* is required for ASHRAE 169 climate zone 0A, 0B, 1A, 1B, 2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C and compliance with $COP2_{H17}$, $COP2_{H5}$ and $IVHE_C$ is required for climate zones 5A, 5B, 5C, 6A, 6B, 7, and 8, but for all US DOE requires compliance with *IVHE* for ≥65,000 Btu/h to <760,000 Btu/h products which includes climate zones 1A, 1B, 2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, and 8.

Make the following changes to SI table 6.8.1-1. Only items that changes are show and full table can be found in the first public review.

Table 6.8.1-1 Electrically Operated Unitary Air Conditioners and Condensing Units – Minimum Efficiency requirements (SI)

Equipment Type	Size Category	Heating Section Type	Subcategory	Minimum Efficiency [g]	Test Procedure[a]
Air-Cooled *Condensing Unit* ≥135,000 Btu/h					
Condensing units air-Cooled	≥70 *kW* and <223 *kW*	All	All U.S. and outside U.S. applications	3.08 COP_C, 3.46 $ICOP_C$ before 1/1/2029 ~~2.93~~ 2.70 $COP2_C$, ~~3.90~~ 3.78 *IVEC* on or after 1/1/2029	AHRI 365 before 1/1/2029 AHRI 1365 on or after 1/1/2029
	≥223 *kW*	All	All U.S. and outside U.S. applications	3.08 COP_C, 3.46 $ICOP_C$ before 1/1/2029 ~~2.55~~ 2.61 $COP2_C$, ~~3.22~~ 3.43 *IVEC* on or after 1/1/2029	

Make the following changes to SI table 6.8.1-2. Only items that changes are show and full table can be found in the first public review.

Table 6.8.1-2 Electrically Operated Air Source Unitary Heat Pumps – Minimum Efficiency requirements (SI)

Equipment Type	Size Category	Heating Section Type	Subcategory	Minimum Efficiency [d]	Test Procedure[a]
HP Air-Source Three-Phase Air Cooled Double Duct Air Conditioners					
Double Duct air-cooled Air conditioners [h]	≥19 *kW* and <40 *kW*	*Electric resistance* (or none)	All U.S. and outside U.S. applications	3.22 COP_C, 3.30 COP_{H47}, before 1/1/2029 2.90 $COP2_C$, 4.10 *IVEC* 2.06 $COP2_{H17}$, 1.65 $COP2_{H5}$ [c] ~~5.98~~ 1.75 *IVHE*, ~~5.70~~ 1.67 $IVHE_C$ [c] on or after 1/1/2029	AHRI 340/360 before 1/1/2029 AHRI 1340 on or after 1/1/2029
		All other including dual fuel heat pumps [f]	All U.S. and outside U.S. applications	~~10.8~~ 3.17COP_C, 3.30 COP_{H47} before 1/1/2029 ~~9.7~~ 2.84 $COP2_C$, ~~14.0~~ 4.10 *IVEC* 2.06 $COP2_{H17}$, 1.65 $COP2_{H5}$ [c] 1.75 *IVHE*, ~~1.67~~ 1.66 $IVHE_C$ [c] on or after 1/1/2029	
	≥40 *kW* and <70 *kW*	*Electric resistance* (or none)	All U.S. and outside U.S. applications	3.11 COP_C 3.30 COP_{H47}, before 1/1/2029 2.73 $COP2_C$, 3.96 *IVEC* 1.89 $COP2_{H17}$, 1.45 $COP2_{H5}$ [c] 1.68 *IVHE*, 1.59 $IVHE_C$ [c] on or after 1/1/2029	
		All other including dual fuel heat pumps [f]		~~10.4~~ 3.05 COP_C 3.30 COP_{H47} before 1/1/2029 2.67 $COP2_C$, ~~13.5~~ 3.96 *IVEC* 1.89 $COP2_{H17}$, 1.45 $COP2_{H5}$ [c] 1.68 *IVHE*, ~~5.44~~ 1.58 $IVHE_C$ [c] on or after 1/1/2029	
	≥70 *kW* and < 88 *kW*	*Electric resistance* (or none)	All U.S. and outside U.S. applications	~~9.5~~ 2.78 COP_C 3.20 COP_{H47} before 1/1/2029 ~~8.0~~ *2.34* $COP2_C$, ~~12.8~~ 3.75 *IVEC* 1.88 $COP2_{H17}$, 1.47 $COP2_{H5}$ [c] 5.47 *IVHE*, 1.59 $IVHE_C$ [c] on or after 1/1/2029	
		All other including dual fuel heat pumps [f]		2.73 COP_C 3.20 COP_{H47} before 1/1/2029 2.29 $COP2_C$, 3.75 *IVEC* 1.88 $COP2_{H17}$, 1.47 $COP2_{H5}$ [c] 1.60 *IVHE*, ~~1.52~~ 1.49 $IVHE_C$ [c] on or after 1/1/2029	
HP Air-Source Unitary Three-Phase Air Cooled Air Conditioners					
Split-*Systems* and Single-Package air-source HP air conditioners	≥19 *kW* and <40 *kW*	*Electric resistance* (or none)	All U.S. and outside U.S. applications	~~11.0~~ 3.22 COP_C, ~~14.1~~ 4.13 $ICOP_C$, 3.40 COP_{H47}, 2.25 COP_{H17} before 1/1/2029 3.05 $COP2_C$ 3.93 *IVEC*, 2.20 $COP2_{H17}$, 1.76 $COP2_{H5}$ [c] 1.82 *IVHE*, 1.74 $IVHE_C$ [c] on or after 1/1/2029	AHRI 340/360 before 1/1/2029 AHRI 1340 on or after 1/1/2029
		All other including dual fuel heat pumps [f]		3.17 COP_C, 4.07 $ICOP_C$ 3.40 COP_{H47}, 2.25 COP_{H17} before 1/1/2029 2.99 $COP2_C$, 3.93 *IVEC*, 2.20 $COP2_{H17}$, 1.76 $COP2_{H5}$ [c] 1.82 *IVHE*, ~~1.74~~ 1.73 $IVHE_C$ [c] on or after 1/1/2029	

	≥40 *kW* and <70 *kW*	*Electric resistance* (or none)	All U.S. and outside U.S. applications	3.11 COP_C, 3.96 $ICOP_C$ 3.30 COP_{H47}, 2.05 COP_{H17} before 1/1/2029 2.90 $COP2_C$, 3.84 *IVEC*, 1.99 $COP2_{H17}$, 1.52 $COP2_{H5}$ [c] 1.76 *IVHE*, 1.67 $IVHE_C$ [c] on or after 1/1/2029	
		All other including dual fuel heat pumps [f]		~~2.84~~ 2.93 COP_C, 3.90 $ICOP_C$ 3.30 COP_{H47}, 2.05 COP_{H17} before 1/1/2029 ~~2.93~~ 2.84 $COP2_C$, 3.84 *IVEC*, 1.99 $COP2_{H17}$, 1.52 $COP2_{H5}$ [c] 1.76 *IVHE*, ~~1.67~~ 1.66 $IVHE_C$ [c] on or after 1/1/2029	
	≥70 *kW* and <223 *kW*	*Electric resistance* (or none)	All U.S. and outside U.S. applications	2.78 COP_C, 3.66 $ICOP_C$ 3.20 COP_{H47}, 2.05 COP_{H17} before 1/1/2029 2.58 $COP2_C$ 3.55 *IVEC* 1.98 $COP2_{H17}$, 1.55 $COP2_{H5}$ [c] 1.70 *IVHE*, 1.67 $IVHE_C$ [c] on or after 1/1/2029	
		All other including dual fuel heat pumps [f]		2.73 COP_C, 3.60 $ICOP_C$ 3.20 COP_{H47}, 2.05 COP_{H17} before 1/1/2029 2.52 $COP2_C$, 3.55 *IVEC* 1.98 COP_{H17}, 1.55 $COP2_{H5}$ [c] 1.70 *IVHE*, ~~1.67~~ 1.66 $IVHE_C$ [c] on or after 1/1/2029	
	≥223 *kW*	*Electric resistance* (or none)	All U.S. and outside U.S. applications	2.78 COP_C, 3.11 $ICOP_C$ 3.20 COP_{H47}, 2.05 COP_{H17} before 1/1/2029 ~~8.8~~ 2.58 $COP2_C$, ~~11.7~~ 3.43 *IVEC* 1.98 COP_{H17}, 1.55 $COP2_{H5}$ [c] 1.70 *IVHE*, 1.62 $IVHE_C$ [c] on or after 1/1/2029	
		All other including dual fuel heat pumps [f]		2.73 COP_C, 3.05 $ICOP_C$ 3.20 COP_{H47}, 2.05 COP_{H17} before 1/1/2029 2.52 $COP2_C$, 3.43 *IVEC* 1.98 COP_{H17}, 1.55 $COP2_{H5}$ [d] 1.70 *IVHE*, ~~1.62~~ 1.61 $IVHE_C$ [d] on or after 1/1/2029	
HP Air-Source Air-Cooled *Condensing Unit*≥135,000 Btu/h					
HP *Condensing units* air-source	≥40 *kW* and <70 *kW*	All	All U.S. and outside U.S. applications	No requirements before 1/1/2029 2.90 $COP2_C$, ~~4.04~~ 3.84 *IVEC* 1.99 $COP2_{H17}$, 1.52 $COP2_{H5}$ [c] 1.76 *IVHE*, 1.67 $IVHE_C$ [c] on or after 1/1/2029	AHRI 365 before 1/1/2029 AHRI 1365 on or after 1/1/2029
	≥70 *kW* and <223 *kW*	All	All U.S. and outside U.S. applications	No requirements before 1/1/2029 2.58 $COP2_C$, ~~12.9~~ 3.54 *IVEC* 1.98 $COP2_{H17}$, 1.55 $COP2_{H5}$ [c] 1.70 *IVHE*, 1.67 $IVHE_C$ [c] on or after 1/1/2029	
	≥223 *kW*	All	All U.S. and outside U.S. applications	No requirements before 1/1/2029 2.58 $COP2_C$, 3.43 *IVEC* 1.98 COP_{H17}, 1.55 $COP2_{H5}$ [d] 1.70 *IVHE*, 1.62 $IVHE_C$ [c] on or after 1/1/2029	

c. For heating efficiency requirement compliance with $COP2_{H17}$ and *IVHE* is required for ASHRAE 169 climate zone 0A, 0B, 1A, 1B, 2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C and compliance with $COP2_{H17}$, $COP2_{H5}$ and $IVHE_C$ is required for climate zones 5A, 5B, 5C, 6A, 6B, 7, and 8, but for all US DOE requires compliance with *IVHE* for ≥19 *kW* to <*223 kW* products which includes climate zones 1A, 1B, 2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, and 8.