



**BSR/ASHRAE/IES Addendum ay  
to ANSI/ASHRAE/IES Standard 90.1-2019**

**Public Review Draft**

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**Proposed Addendum ay to  
Standard 90.1-2019, Energy Standard  
for Buildings Except Low-Rise  
Residential Buildings**

**First Public Review (November 2021)  
(Draft Shows Proposed Changes to Current Standard)**

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## FOREWORD

Tables 6.8.1-8 and 6.8.1-9 of ANSI/ASHRAE/IES Standard 90.1-2019 address the minimum efficiency requirements for Variable Refrigerant Flow (VRF) Air Conditioners and Heat Pumps, respectively. Presently, these minimum efficiency requirements are based on the following energy efficiency metrics:

- For Cooling:
  - SEER (for air-cooled systems with cooling capacity <65,000 Btu/h) (SEER2 after 1/1/23)
  - EER and IEER (for systems with cooling capacity ≥65,000 Btu/h)
- For Heating:
  - HSPF (for air-cooled systems with cooling capacity <65,000 Btu/h) (HSPF2 after 1/1/23)
  - COP<sub>H</sub> at varying rating conditions (for systems with cooling capacity ≥65,000 Btu/h)

In 2018, the U.S. Department of Energy (DOE) Appliance Standards and Rulemaking Federal Advisory Committee (ASRAC) VRF Working Group (WG) began negotiation meetings to revise the test procedure (TP) and Energy Conservation Standards (ECS) for VRF equipment. This WG comprised of representatives from the following stakeholder groups: Energy/Environment Advocates, Utilities, VRF Original Equipment Manufacturers (OEMs), Consumer Advocates/Users, and Regulatory Authorities. A full list of WG participation is available on the DOE ASRAC website.<sup>1</sup> The TP term sheet was approved on October 1st, 2019. The ECS term sheet was approved November 15 2019.

Significant modifications were made to the TP for VRF equipment via the ASRAC negotiation process and a TP term sheet was approved on October 1, 2019.<sup>2</sup> Subsequently, AHRI published the final TP, AHRI Standard 1230, *Performance Rating of Variable Refrigerant Flow (VRF) Multi-Split Air-Conditioning and Heat Pump Equipment*, on May 18, 2021.<sup>3</sup> Several test procedure revisions were made such that VRF system ratings in accordance with AHRI Standard 1230-2021 are not equivalent to the system ratings in accordance with preceding AHRI Standard 1230 versions. A notable revision incorporated with AHRI Standard 1230-2021 is the setting of a new Sensible Heat Ratio (SHR) requirement at the 100% and 75% cooling test load conditions (see Section 6.3.3.2). The new SHR requirement limits the sensible cooling capacity relative to the total cooling capacity at both 100% and 75% cooling test loads. As a result, the indoor airflow and the corresponding net cooling capacity used to calculate the system's EER at 100% and 75% cooling load points will decrease.

The ECS for VRF were also negotiated by the ASRAC VRF WG and the final term sheet was approved on November 5, 2019.<sup>4</sup> Per the term sheets, the energy efficiency metric used to determine the energy conservation standards is recommended to move from EER (at 100% cooling load point) to IEER. Further,

<sup>1</sup> <https://www.energy.gov/eere/buildings/appliance-standards-and-rulemaking-federal-advisory-committee#Variable%20Refrigerant%20Flow%20Multi-Split%20Air%20Conditioners%20and%20Heat%20Pumps%20Working%20Group>

<sup>2</sup> <https://www.regulations.gov/document/EERE-2018-BT-STD-0003-0044>

<sup>3</sup> [https://www.ahrinet.org/App\\_Content/ahri/files/STANDARDS/AHRI/AHRI\\_Standard\\_1230-2021.pdf](https://www.ahrinet.org/App_Content/ahri/files/STANDARDS/AHRI/AHRI_Standard_1230-2021.pdf)

<sup>4</sup> <https://www.regulations.gov/document/EERE-2018-BT-STD-0003-0055>

the IEER and COP<sub>H</sub> ECS recommended in the term sheet are the same numbers as the current minimum efficiency requirement levels in ANSI/ASHRAE/IES Standard 90.1-2019; however, given the increased stringency in the test procedure, AHRI 1230-2021, these same numbers represent a 12% increase in efficiency.<sup>5</sup> The term sheets also recommend a proposed effective date to DOE of January 1, 2024, for both the TP and ECS, in line with the Term Sheet.

To address the outcome of these DOE ASRAC VRF WG negotiations in the ANSI/ASHRAE/IES Standard 90.1, this addendum proposes the following changes:

1. Update the Test Procedure reference under Tables 6.8.1-8 and 6.8.1-9 to “AHRI Standard 1230-2021”, with an effective date of January 1, 2024.
2. Add a note under Tables 6.8.1-8 and 6.8.1-9 clarifying the difference between a VRF heat pump system and a VRF heat pump system with heat recovery modules.
3. Add a note under Tables 6.8.1-8 and 6.8.1-9 clarifying the outdoor-indoor combination used for ratings per AHRI Standard 1230.
4. Strike-out dated/expired IEER and COP<sub>H</sub> efficiency levels for certain VRF system types.
5. Strike-out of air-cooled, single-phase VRF multi-split air conditioners and heat pumps with cooling capacity less than 65,000 Btu/h in tables 6.8.1-8 and 6.8.1-9. These are considered residential central air conditioners and heat pumps and are regulated under the energy conservation program for consumer products. 10 CFR part 430, subpart B, appendices M and M1 and 10 CFR part 430, subpart C.

### **Economic Analysis**

DOE estimates the average annual per-unit energy consumption is approximately 9,100 kWh.<sup>6</sup> Nationally, VRF consume an estimated 0.04 percent of all national annual building energy use for an estimated total of 0.01 quads of primary energy consumption in 2016.<sup>7</sup> DOE also estimates approximately 28,000 VRF multi-split systems are shipped annually in the United States.<sup>8</sup> This efficiency improvement will remove a significant percentage of products from the market by increasing IEER and EER levels and by requiring retesting of all products to comply with the new test procedure. DOE is completing a cost effectiveness study of this measure proposal for the forthcoming rulemaking, it is expected to be within ASHRAE’s scalar limit of 12 years for a product with a 15 year life so the change is cost effective.

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<sup>5</sup> *Variable Refrigerant Flow (VRF) Multi-Split Air Conditioners and Heat Pumps: Appliance Standards and Rulemaking Federal Advisory Committee (ASRAC) Working Group Meeting 9*. Washington, DC: DOE.  
[www.regulations.gov/document?D=EERE-2018-BTSTD-0003-0056](https://www.regulations.gov/document?D=EERE-2018-BTSTD-0003-0056)

<sup>6</sup> DOE VRF FAQ: <https://www.energy.gov/sites/prod/files/2019/07/f64/vrf-ecs-rfi-noda-faq.pdf>

<sup>7</sup> *Ibid.*

<sup>8</sup> *Ibid.*

*[Note to Reviewers: This addendum makes proposed changes to the current standard. 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 current standard 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 changes.]*

## Addendum ay to ANSI/ASHRAE/IES Standard 90.1-2019

*Make the following changes to Tables 6.8.1-8 and 6.8.1-9 (IP)*

**Table 6.8.1-8 Electrically Operated Variable-Refrigerant-Flow Air Conditioners—Minimum Efficiency Requirements**

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
VRF air conditioners, air-cooled <sup>a</sup>	<65,000 Btu/h <u>three-phase for applications in the US and single- and three-phase for applications outside the US</u>	All	VRF multisplit system	Before 1/1/23 13.0 SEER On or after 1/1/23 SEER2 = 13.4	AHRI 1230-2014 with <u>Addendum 1 (before 1/1/2023)</u>  AHRI 210/240-2023 (on or after 1/1/2023)
	≥65,000 Btu/h and <135,000 Btu/h	Electric resistance (or none)	VRF multisplit system	11.2 EER 15.5 IEER	AHRI 1230-2014 with <u>Addendum 1 (before 1/1/2024)</u>
	≥135,000 Btu/h and <240,000 Btu/h	Electric resistance (or none)	VRF multisplit system	11.0 EER 14.9 IEER	AHRI 1230-2021 (on or after 1/1/2024)
	≥240,000 Btu/h	Electric resistance (or none)	VRF multisplit system	10.0 EER 13.9 IEER	

**Notes:**

- a. VRF outdoor units can be combined with innumerable indoor unit combinations which will vary by application, building type, building size, operating conditions, and comfort level goals. Selection of indoor units tested during the test is considered to be representative of commonly sold applications and is detailed in AHRI Standard 1230.

**Informative Note:** For single-phase VRF air conditioners, air-cooled systems less than 65,000 Btu/h see Table F-1 in Informative Appendix F for the U.S. Department of Energy Minimum.

**Table 6.8.1-9 Electrically Operated Variable-Refrigerant-Flow and Applied Heat Pumps— Minimum Efficiency Requirements**

Equipment Type <sup>a</sup>	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
VRF air-cooled (cooling mode)	<65,000 Btu/h <u>three-phase for applications in the US and single- and three-phase for applications outside the US</u>	All	VRF multisplit system	Before 1/1/2023 13.0 SEER  On or after 1/1/2023 SEER2 = 13.4	AHRI 1230-2014 with <u>Addendum 1 (before 1/1/2023)</u>  AHRI 210/240-2023 (on or after 1/1/2023)
				11.0 EER 14.6 IEER	AHRI 1230-2014 with <u>Addendum 1 (before 1/1/2024)</u>
	≥65,000 Btu/h and <135,000 Btu/h	Electric resistance (or none)	VRF multisplit system with heat recovery	10.8 EER 14.4 IEER	AHRI 1230-

	≥135,000 Btu/h and <240,000 Btu/h	All	VRF multisplit system	10.6 EER 13.9 IEER	<u>2021(on or after 1/1/2024)</u>
			VRF multisplit system with heat recovery	10.4 EER 13.7 IEER	
	≥240,000 Btu/h		VRF multisplit system	9.5 EER 12.7 IEER	
	VRF multisplit system with heat recovery		9.3 EER 12.5 IEER		
VRF water source (cooling mode)	<65,000 Btu/h	All	VRF multisplit systems 86°F entering water	12.0 EER 16.0 IEER	AHRI 1230-2014 with <u>Addendum 1 (before 1/1/2024)</u>
			VRF multisplit systems with heat recovery 86°F entering water	11.8 EER 15.8 IEER	
	≥65,000 Btu/h and <135,000 Btu/h		VRF multisplit system 86°F entering water	12.0 EER 16.0 IEER	AHRI 1230-2021 (on or after 1/1/2024)
			VRF multisplit system with heat recovery 86°F entering water	11.8 EER 15.8 IEER	
	≥135,000 Btu/h and <240,000 Btu/h		VRF multisplit system 86°F entering water	10.0 EER 14.0 IEER	
			VRF multisplit system with heat recovery 86°F entering water	9.8 EER 13.8 IEER	
	≥240,000 Btu/h		VRF multisplit system 86°F entering water	10.0 EER 12.0 IEER	
			VRF multisplit system with heat recovery 86°F entering water	9.8 EER 11.8 IEER	
VRF groundwater source (cooling mode)	<135,000 Btu/h	All	VRF multisplit system 59°F entering water	16.2 EER	AHRI 1230 – 2014 with <u>Addendum 1 (before 1/1/2024)</u>
			VRF multisplit system with heat recovery 59°F entering water	16.0 EER	
	≥135,000 Btu/h		VRF multisplit system 59°F entering water	13.8 EER	AHRI 1230-2021 (on or after 1/1/2024)
			VRF multisplit system with heat recovery 59°F entering water	13.6 EER	

Notes:

- a. VRF outdoor units can be combined with innumerable indoor unit combinations which will vary by application, building type, building size, operating conditions, and comfort level goals. Selection of indoor units tested during the test is considered to be representative of commonly sold applications and is detailed in AHRI Standard 1230.

*Informative Note:* For single-phase VRF multisplit system less than 65,000 Btu/h see Table F-1 in [Informative Appendix F](#) for the U.S. Department of Energy minimum.

**Table 6.8.1-9 Electrically Operated Variable-Refrigerant-Flow and Applied Heat Pumps— Minimum Efficiency Requirements (Continued)**

Equipment Type <sup>a</sup>	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
VRF ground source (cooling mode)	<135,000 Btu/h	All	VRF multisplit system 77°F entering water	13.4 EER	AHRI 1230-2014 with <u>Addendum 1 (before 1/1/2024)</u>
			VRF multisplit system with heat recovery 77°F entering water	13.2 EER	
					<u>AHRI Standard</u>

	≥135,000 Btu/h		<i>VRF</i> multisplit system 77°F entering water	11.0 <i>EER</i>	<u>1230-2021 (on or after 1/1/2024)</u>
			<i>VRF</i> multisplit system with heat recovery 77°F entering water	10.8 <i>EER</i>	
<i>VRF</i> air-cooled (heating mode)	<65,000 Btu/h (cooling capacity) <u>three-phase applications in the US and single and three-phase for applications outside the US</u>	All	<i>VRF</i> multisplit system	<u>7.7 HSPF Before 1/1/2023</u>  On or after 1/1/2023 HSPF2 = 7.5	AHRI 1230-2014 with <u>Addendum 1 (before 1/1/2023)</u>  AHRI 210/240-2023 on or after 1/1/2023
	≥65,000 Btu/h and <135,000 Btu/h (cooling capacity)		<i>VRF</i> multisplit system 47°F db/43°F wb outdoor air	3.3 <i>COP<sub>H</sub></i>	AHRI 1230-2014 with <u>Addendum 1 (before 1/1/2024)</u>
			17°F db/15°F wb outdoor air	2.25 <i>COP<sub>H</sub></i>	
	≥135,000 Btu/h (cooling capacity)		<i>VRF</i> multisplit system 47°F db/43°F wb outdoor air	3.2 <i>COP<sub>H</sub></i>	AHRI Standard <u>1230-2021 (on or after 1/1/2024)</u>
			17°F db/15°F wb outdoor air	2.05 <i>COP<sub>H</sub></i>	
<i>VRF</i> water source (heating mode)	<65,000 Btu/h (cooling capacity)	All	<i>VRF</i> multisplit system 68°F entering water	4.3 <i>COP<sub>H</sub></i>	AHRI 1230-2014 with <u>Addendum 1 (before 1/1/2024)</u>
	≥65,000 Btu/h and <135,000 Btu/h (cooling capacity)		<i>VRF</i> multisplit system 68°F entering water	4.3 <i>COP<sub>H</sub></i>	
	≥135,000 Btu/h and <240,000 Btu/h (cooling capacity)		<i>VRF</i> multisplit system 68°F entering water	4.0 <i>COP<sub>H</sub></i>	AHRI 1230-2021 (on or after 1/1/2024)
	≥240,000 Btu/h (cooling capacity)		<i>VRF</i> multisplit system 68°F entering water	3.9 <i>COP<sub>H</sub></i>	
<i>VRF</i> groundwater source (heating mode)	<135,000 Btu/h (cooling capacity)	All	<i>VRF</i> multisplit system 50°F entering water	3.6 <i>COP<sub>H</sub></i>	AHRI 1230-2014 with <u>Addendum 1 (before 1/1/2024)</u>
	≥135,000 Btu/h (cooling capacity)		<i>VRF</i> multisplit system 50°F entering water	3.3 <i>COP<sub>H</sub></i>	
					AHRI 1230-2021 (on or after 1/1/2024)
<i>VRF</i> ground source (heating mode)	<135,000 Btu/h (cooling capacity)	All	<i>VRF</i> multisplit system 32°F entering water	3.1 <i>COP<sub>H</sub></i>	AHRI 1230-2014 with <u>Addendum 1 (before 1/1/2024)</u>
	≥135,000 Btu/h (cooling capacity)		<i>VRF</i> multisplit system 32°F entering water	2.8 <i>COP<sub>H</sub></i>	
					AHRI 1230-2021 (on or after 1/1/2024)

Notes:

- a. *VRF* outdoor units can be combined with innumerable indoor unit combinations which will vary by application, building type, building size, operating conditions, and comfort level goals. Selection of indoor units tested during the test is considered to be representative of commonly sold applications and is detailed in AHRI Standard 1230.

Informative Note: For single-phase air-cooled *VRF* multisplit system less than 65,000 Btu/h see Table F-1 in Informative Appendix F for the U.S. Department of Energy minimum.

*Make the following changes to Tables 6.8.1-8 and 6.8.1-9 (SI)*

**Table 6.8.1-8 Electrically Operated Variable-Refrigerant-Flow Air Conditioners—Minimum Efficiency Requirements**

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
VRF air conditioners, air-cooled <sup>a</sup>	<19 kW <u>three-phase for applications in the US and single- and three-phase for applications outside the US</u>	All	VRF multisplit system	3.81 SCOP <sub>C</sub> Before 1/1/23	AHRI 1230-2014 with Addendum 1 (before 1/1/2023)
				On or after 1/1/2023 SCOP <sub>2C</sub> = 4.19	
	≥19 kW and <40 kW	Electric resistance (or none)	VRF multisplit system	3.28 COP <sub>C</sub> 4.54 ICOP	AHRI 1230-2014 with Addendum 1 (before 1/1/2024)
	≥40 kW and <70 kW	Electric resistance (or none)	VRF multisplit system	3.22 COP <sub>C</sub> 4.37 ICOP	AHRI 1230-2021 (on or after 1/1/2024)
≥70 kW	Electric resistance (or none)	VRF multisplit system	2.93 COP <sub>C</sub> 4.07 ICOP	AHRI 1230-2021 (on or after 1/1/2024)	

Notes:

- a. VRF outdoor units can be combined with innumerable indoor unit combinations which will vary by application, building type, building size, operating conditions, and comfort level goals. Selection of indoor units tested during the test is considered to be representative of commonly sold applications and is detailed in AHRI Standard 1230.

**Informative Note:** For single-phase VRF air conditioners, air-cooled systems less than 65,000 Btu/h see Table F-1 in Informative Appendix F for the U.S. Department of Energy Minimum.

**Table 6.8.1-9 Electrically Operated Variable-Refrigerant-Flow and Applied Heat Pumps— Minimum Efficiency Requirements**

Equipment Type <sup>a</sup>	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
VRF air-cooled (cooling mode)	<19 kW <u>three-phase for applications in the US and single- and three-phase for applications outside the US</u>	All	VRF multisplit system	3.81 SCOP <sub>C</sub> Before 1/1/2023	AHRI 1230-2014 with Addendum 1 (before 1/1/2023)
				On or after 1/1/2023 SCOP <sub>C</sub> = 4.19	
	≥19 kW and <40 kW	Electric resistance (or none)	VRF multisplit system	3.22 COP <sub>C</sub> 4.28 ICOP <sub>C</sub>	AHRI 210/240-2023 (on or after 1/1/2023)
				VRF multisplit system with heat recovery	
	≥40 kW and <70 kW	Electric resistance (or none)	VRF multisplit system	3.11 COP <sub>C</sub> 4.07 ICOP <sub>C</sub>	AHRI 1230-2014 with Addendum 1 (before 1/1/2024)
	VRF multisplit system with heat recovery		3.05 COP <sub>C</sub> 4.01 ICOP <sub>C</sub>		
≥70 kW	Electric resistance (or none)	VRF multisplit system	2.78 COP <sub>C</sub> 3.72 ICOP <sub>C</sub>	AHRI 1230-2021 (on or after 1/1/2024)	
		VRF multisplit system with heat recovery	2.73 COP <sub>C</sub> 3.66 ICOP <sub>C</sub>		
VRF water source (cooling mode)	<19 kW	All	VRF multisplit systems 30°C entering water	3.52 COP <sub>C</sub> 4.69 ICOP <sub>C</sub>	AHRI 1230-2014 with Addendum 1 (before 1/1/2024)
			VRF multisplit systems with heat recovery 30°C entering water	3.46 COP <sub>C</sub> 4.63 ICOP <sub>C</sub>	

	≥19 kW and <40 kW	All	VRF multisplit system 30°C entering water	3.52 COP <sub>C</sub> 4.69 ICOP <sub>C</sub>	AHRI 1230-2021 (on or after 1/1/2024)
			VRF multisplit system with heat recovery 30°C entering water	3.46 COP <sub>C</sub> 4.63 ICOP <sub>C</sub>	
	≥40 kW and <70 kW		VRF multisplit system 30°C entering water	2.93 COP <sub>C</sub> 4.10 ICOP <sub>C</sub>	
			VRF multisplit system with heat recovery 30°C entering water	2.87 COP <sub>C</sub> 3.52 ICOP <sub>C</sub>	
	≥70 kW		VRF multisplit system 30°C entering water	2.93 COP <sub>C</sub> 3.52 ICOP <sub>H</sub>	
			VRF multisplit system with heat recovery 30°C entering water	2.87 COP <sub>C</sub> 3.46 ICOP <sub>H</sub>	
VRF groundwater source (cooling mode)	<40 kW	All	VRF multisplit system 15°C entering water	4.75 COP <sub>C</sub>	AHRI 1230-2014 with Addendum 1 (before 1/1/2024)
			VRF multisplit system with heat recovery 15°C entering water	4.69 COP <sub>C</sub>	
	≥40 kW		VRF multisplit system 15°C entering water	4.04 COP <sub>C</sub>	AHRI 1230-2021 (on or after 1/1/2024)
			VRF multisplit system with heat recovery 15°C entering water	3.99 COP <sub>C</sub>	
VRF ground source (cooling mode)	<40 kW	All	VRF multisplit system 25°C entering water	3.93 COP <sub>C</sub>	AHRI 1230-2014 with Addendum 1 (before 1/1/2024)
			VRF multisplit system with heat recovery 25°C entering water	3.87 COP <sub>C</sub>	
	≥40 kW		VRF multisplit system 25°C entering water	3.22 COP <sub>C</sub>	AHRI 1230-2021 (on or after 1/1/2024)
			VRF multisplit system with heat recovery 25°C entering water	3.16 COP <sub>C</sub>	

Notes:

- a. VRF outdoor units can be combined with innumerable indoor unit combinations which will vary by application, building type, building size, operating conditions, and comfort level goals. Selection of indoor units tested during the test is considered to be representative of commonly sold applications and is detailed in AHRI Standard 1230.

Informative Note: For single-phase air-cooled VRF multisplit system less than 19 kW see Table F-1 in Informative Appendix F for the U.S. Department of Energy minimum.

**Table 6.8.1-9 Electrically Operated Variable-Refrigerant-Flow and Applied Heat Pumps— Minimum Efficiency Requirements (Continued)**

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
VRF air-cooled (heating mode)	<19 kW (cooling capacity) <u>three-phase for applications in the US and single- and three-phase for applications outside the US</u>		VRF multisplit system	2.25 SCOP <sub>H</sub> <u>Before 1/1/23</u>	AHRI 1230-2014 with Addendum 1 (before 1/1/2023)
				<u>On or after 1/1/2023</u> SCOP <sub>H</sub> = 2.20	
	≥19 kW and <40 kW (cooling capacity)		VRF multisplit system 8.3°C db/6.1°C wb <i>outdoor air</i>	3.3 COP <sub>H</sub>	AHRI 1230-2014 with Addendum 1 (before 1/1/2024)
			−8.3°C db/−9.4°C wb <i>outdoor air</i>	2.25 COP <sub>H</sub>	



	≥40 kW (cooling capacity)		<i>VRF multisplit system</i> 8.3°C db/6.1°C wb <i>outdoor air</i>	3.2 $COP_H$	<u>AHRI Standard 1230-2021 (on or after 1/1/2024)</u>
			–8.3°C db/–9.4°C wb <i>outdoor air</i>	2.05 $COP_H$	
<i>VRF water source</i> (heating mode)	<19 kW (cooling capacity)		<i>VRF multisplit system</i> 20°C entering water	4.3 $COP_H$	<u>AHRI 1230-2014 with Addendum 1 (before 1/1/2024)</u>
	≥19 kW and <40 kW (cooling capacity)		<i>VRF multisplit system</i> 20°C entering water	4.3 $COP_H$	
	≥40 kW and <70 kW (cooling capacity)		<i>VRF multisplit system</i> 20°C entering water	4.0 $COP_H$	<u>AHRI Standard 1230-2021 (on or after 1/1/2024)</u>
	≥70 kW (cooling capacity)		<i>VRF multisplit system</i> 20°C entering water	3.9 $COP_H$	
<i>VRF groundwater source</i> (heating mode)	<40 kW (cooling capacity)		<i>VRF multisplit system</i> 10°C entering water	3.6 $COP_H$	<u>AHRI 1230-2014 with Addendum 1 (before 1/1/2024)</u>
	≥40 kW (cooling capacity)		<i>VRF multisplit system</i> 10°C entering water	3.3 $COP_H$	
					<u>AHRI Standard 1230-2021 (on or after 1/1/2024)</u>
<i>VRF ground source</i> (heating mode)	<40 kW (cooling capacity)		<i>VRF multisplit system</i> 0°C entering water	3.1 $COP_H$	<u>AHRI 1230-2014 with Addendum 1 (before 1/1/2024)</u>
	≥40 kW (cooling capacity)		<i>VRF multisplit system</i> 0°C entering water	2.8 $COP_H$	
					<u>AHRI Standard 1230-2021 (on or after 1/1/2024)</u>

Notes:

- a. *VRF outdoor units can be combined with innumerable indoor unit combinations which will vary by application, building type, building size, operating conditions, and comfort level goals. Selection of indoor units tested during the test is considered to be representative of commonly sold applications and is detailed in AHRI Standard 1230.*

*Informative Note: For single-phase air-cooled VRF multisplit system less than 19 kW see Table F-1 in Informative Appendix F for the U.S. Department of Energy minimum.*