ENERGY STAR® Program Requirements
Product Specification for Light Commercial HVAC

Eligibility Criteria
Draft 1, Version 4.0

Following is the Draft 1 Version 4.0 ENERGY STAR product specification for light commercial HVAC equipment. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

1) Definitions: Below are the definitions of the relevant terms in this document.

A. Commercial Package Air-Conditioning and Heating Equipment[1]: Electrically operated, unitary central air conditioners and central air-conditioning heat pumps used for commercial applications. Small commercial package air-conditioning and heating equipment is rated below 135,000 Btu/h cooling capacity. Large commercial package air-conditioning and heating equipment is rated at or above 135,000 Btu/h and below 240,000 Btu/h cooling capacity.

a) Commercial Unitary Air Conditioner (CUAC): An air conditioner model consists of one or more factory-made assemblies that normally include an evaporator or cooling coil(s), compressor(s), and condenser(s). Air conditioners provide the function of air cooling, and may include the functions of air circulation, air cleaning, dehumidifying, or humidifying.

b) Commercial Unitary Heat Pump (CUHP): A heat pump model consists of one or more factory-made assemblies that normally include an indoor conditioning coil(s), compressor(s), and outdoor coil(s), including means to provide a heating function. Heat pumps shall provide the function of air heating with controlled temperature, and may include the functions of air cooling, air circulation, air cleaning, dehumidifying, or humidifying.

Note: EPA refers to Light Commercial Air Conditioners and Heat Pumps under the scope of this specification as Commercial Unitary Air Conditioners (CUAC) and Commercial Unitary Heat Pumps (CUHPs), respectively, to align with how the Department of Energy (DOE) refers to these types of equipment.

B. Gas/Electric Package Unit: Single package commercial package air-conditioning and heating equipment with gas heating and electric air-conditioning that is often installed on a slab or a roof.

C. Variable Refrigerant Flow Multi-Split Air Conditioner[1]: A unit of commercial package air-conditioning and heating equipment that is configured as a split system air conditioner incorporating a single refrigerant circuit, with one or more outdoor units, at least one variable-speed compressor or an alternate compressor combination for varying the capacity of the system by three or more steps, and multiple indoor fan coil units, each of which is individually metered and individually controlled by an integral control device and common communications network and which can operate independently in response to multiple indoor thermostats. Variable refrigerant flow implies three or more steps of capacity control on common, inter-connecting piping.

[1] Based on 10 CFR part 431, Subpart F §431.92. In case of conflict, the CFR shall be taken as authoritative.

D. Variable Refrigerant Flow Multi-Split Heat Pump[1]: A unit of commercial package air-conditioning and heating equipment that is configured as a split system heat pump that uses reverse cycle refrigeration as its primary heating source and which may include secondary supplemental heating by means of electrical resistance, steam, hot water, or gas. The equipment incorporates a single refrigerant circuit, with one or more outdoor units, at least one variable-speed compressor or an alternate compressor combination for varying the capacity of the system by three or more steps, and multiple indoor fan coil units, each of which is individually metered and individually controlled by a control device and common communications network, and which can operate independently in response to multiple indoor thermostats. Variable refrigerant flow implies three or more steps of capacity control on common, inter-connecting piping.

E. Basic Model[1]:

a) Commercial Package Air-Conditioning and Heating Equipment: All units manufactured by one manufacturer within a single equipment class, having the same or comparably performing compressor(s), heat exchangers, and air moving system(s) that have a common "nominal" cooling capacity.

b) Variable Refrigerant Flow Multi-Split: All units manufactured by one manufacturer within a single equipment class, having the same primary energy source (e.g., electric or gas), and which have the same or comparably performing compressor(s) that have a common "nominal" cooling capacity and the same heat rejection medium (e.g. air or water).

F. Cooling Capacity[2]: The capacity associated with the change in air enthalpy between the air entering the unit and the air leaving the unit, which includes both the latent (change in humidity ratio) and sensible (change in dry-bulb temperature) capacities expressed in Btu/h and include the heat of circulation fan(s) and motor(s).

G. Energy Efficiency Ratio (EER)[1]: The ratio of the produced cooling effect of an air conditioner or heat pump to its net work input, expressed in Btu/watt-hour.

H. Coefficient of Performance (COP)[1]: The ratio of the produced cooling effect of an air conditioner or heat pump (or its produced heating effect, depending on the mode of operation) to its net work input, when both the cooling (or heating) effect and the net work input are expressed in identical units of measurement.

I. Integrated Energy Efficiency Ratio (IEER)[1]: A weighted average calculation of mechanical cooling EERs determined for four load levels and corresponding rating conditions, as measured in Appendix A of Subpart F of 10 CFR part 431, expressed in Btu/watt-hour.

2) Scope:

A. Included Products: Air-cooled, three-phase, split system (i.e., any CUAC or CUHP in which one or more of the major assemblies are separate from the others) and single package (i.e., any CUAC or CUHP in which all the major assemblies are enclosed in one cabinet) central air conditioners, heat pumps, gas/electric package units, and variable refrigerant flow (VRF) multi-split systems with capacity rated to be below 240,000 Btu/h that meet the definitions specified herein are eligible for ENERGY STAR certification, with the exception of products listed in Section 2.B.

B. Excluded Products: Water-cooled, evaporatively-cooled, and water source commercial products are not eligible under this specification. Products covered by other ENERGY STAR specifications are not eligible under this specification. Note that single-phase products below 65,000 Btu/h may

[2] AHRI Standard 340/360-2015. *Performance Rating of Commercial and Industrial Unitary Air-conditioning and Heat Pump Equipment.*

be certified as ENERGY STAR under the CAC/ASHP specification.

Note: EPA proposes to reintroduce air-cooled, three-phase units with a cooling capacity below 65,000 Btu/h to the scope of this specification based on manufacturer feedback indicating that the market would be best served by an ENERGY STAR specification that offers certification to these products. Similarly, incentivizing efficiency advancements for these products plays a critical part in reaching national decarbonization goals.

3) Certification Criteria:

A. Energy Efficiency Requirements:

a. Certification Metric Criteria

Table 1: Criteria for ENERGY STAR Certified CUACs

Equipment Type	Cooling Capacity	Heating Section Type	Minimum Energy Efficiency Criteria
Very Small CUAC (Single Package)	< 65,000 Btu/h	All	12.4 EER; 16.0 SEER
Very Small CUAC (Split System)	< 65,000 Btu/h	All	12.9 EER; 16.0 SEER
Small CUAC	≥ 65,000 Btu/h – < 135,000 Btu/h	Electric Resistance (or None)	12.8 EER; 19.9 IEER
		All other	12.4 EER; 19.6 IEER
Large CUAC	≥ 135,000 Btu/h – < 240,000 Btu/h	Electric Resistance (or None)	12.5 EER; 18.5 IEER
		All other	12.1 EER; 18.2 IEER

Table 2: Criteria for ENERGY STAR Certified CUHPs

Equipment Type	Cooling Capacity	Heating Section Type	Minimum Energy Efficiency Criteria
Very Small CUHP (Single Package)	< 65,000 Btu/h	All	12.4 EER; 16.0 SEER; 8.2 HSPF
Very Small CUHP (Split System)	< 65,000 Btu/h	All	12.9 EER; 16.0 SEER; 9.0 HSPF
Small CUHP	≥ 65,000 Btu/h – < 135,000 Btu/h	Electric Resistance (or None)	12.1 EER; 16.0 IEER; 3.5 COP at 47°F; 2.4 COP at 17°F
		All other	12.1 EER; 15.7 IEER; 3.5 COP at 47°F; 2.4 COP at 17°F
Large CUHP	≥ 135,000 Btu/h – < 240,000 Btu/h	Electric Resistance (or None)	11.1 EER; 17.3 IEER; 3.5 COP at 47°F; 2.1 COP at 17°F
		All other	11.1 EER; 17.0 IEER; 3.5 COP at 47°F; 2.1 COP at 17°F

Note: EPA is revising the Light Commercial HVAC specification due to: 1) new federal minimum standards that will go into effect on January 1, 2023, for commercial air conditioners and heat pumps; and 2) broad availability of products meeting ENERGY STAR Light Commercial HVAC Version 3.1 criteria in the marketplace. To continue to recognize the most energy-efficient products available, EPA proposes updated requirements for Light Commercial CUACs and CUHPs as presented in Table 1 and Table 2, respectively.

The EER, SEER, and HSPF requirements proposed for Very Small products with cooling capacities below 65,000 btu/h are intended to be aligned with the respective CEE Tier 2 for each type of equipment.

The IEER and COP at 47°F requirements proposed in Tables 1 and 2 align with the Level 4 efficiency benchmark evaluated by the Department of Energy (DOE) in their 2015 *Technical Support Document: Energy Efficiency for Commercial and Industrial Equipment*. The exception to this is the IEER requirement for Small CUHPs, which with a value of 16.0, is between DOE's Level 3.5 and Level 4. For those metrics not explored in the TSD (EER, and COP at 17F), EPA analyzed data from the AHRI directory to identify appropriate levels.

The proposed requirements differentiate between standard and high efficiency products while providing a balance between product availability and energy savings. Through analysis of the efficiency research included in the 2014 and 2015 TSDs, EPA estimates that CUACs performing at the proposed ENERGY STAR LC HVAC Version 4.0 levels will provide annual savings of up to 340 kWh per very small unit, 277 kWh per small unit and 5,772 kWh per large unit when replacing products that perform at the 2023 federal baseline. Similarly, CUHPs at Version 4.0 levels are expected to save 238 kWh per very small unit, 794 kWh per small unit and 6,155 kWh per large unit in cooling costs annually. EPA has not estimated payback because we have not been able to find cost information more recent than 2015 for units of any size bin; we welcome stakeholder feedback on this point.

If all CUACs and CUHPs under the scope of this specification sold were to meet these criteria, EPA estimates that the national savings would grow to over 55.2 TWh, or over 39.1 MMT CO_2e.

Table 3: Criteria for ENERGY STAR Certified Light Commercial VRF Multi-Split Systems*

Equipment Type	Cooling Capacity	Heating Section Type	Minimum Energy Efficiency Criteria
Very Small VRF Air-Cooled Air Conditioner	< 65,000 Btu/h	All	12.9 EER; 16.0 SEER
Small VRF Air-Cooled Air Conditioner	≥ 65,000 Btu/h – < 135,000 Btu/h	All	12.0 EER; 17.4 IEER
Large VRF Air-Cooled Air Conditioner	≥ 135,000 Btu/h – < 240,000 Btu/h	All	12.0 EER; 16.4 IEER
Very Small VRF Air-Cooled Heat Pump	< 65,000 Btu/h	All	12.9 EER; 16.0 SEER; 9.0 HSPF
Small VRF Air-Cooled Heat Pump	≥ 65,000 Btu/h – < 135,000 Btu/h	Without Heat Recovery	11.8 EER; 17.4 IEER; 3.4 COP at 47°F
		With Heat Recovery	11.6 EER; 17.2 IEER; 3.4 COP at 47°F
Large VRF Air-Cooled Heat Pump	≥ 135,000 Btu/h – < 240,000 Btu/h	Without Heat Recovery	10.9 EER; 16.4 IEER; 3.3 COP at 47°F
		With Heat Recovery	10.7 EER; 16.2 IEER; 3.3 COP at 47°F

* VRF models must meet these requirements in ducted, ductless, and mixed configurations to be certified.

Note: The U.S. Department of Energy is currently reviewing the test method and standard applicable to the VRF equipment covered by the scope of this specification as a part of their revision process. As that process nears completion, EPA will analyze the market and standards for VRF products to determine if a revision is indicated.

EPA proposes criteria for Very Small VRF products to align with the criteria proposed for split and packaged CUACs and CUHPs but has been unable to determine the market size for VRF products of this size. We invite stakeholders to comment on whether these products have a significant market presence.

B. Cold Climate Heat Pumps: For purposes of ENERGY STAR certification, a Heat Pump model may be designated as Cold Climate if it meets the following:

Table 4: Energy-Efficiency Criteria for Certified Cold Climate Light Commercial Heat Pumps*

Equipment Type	Cooling Capacity	Minimum Energy Efficiency Criteria
Very Small CUHP (Single Package)	< 65,000 Btu/h	11.8 EER; 15.0 SEER; 9.0 HSPF; 2.4 COP at 17°F; Percent of Heating Capacity at 17°F ≥ 60% of that at 47°F
Very Small CUHP (Split System)	< 65,000 Btu/h	11.8 EER; 15.0 SEER; 9.5 HSPF2; 2.4 COP at 17°F Percent of Heating Capacity at 17°F ≥ 60% of that at 47°F
Small CUHP	≥ 65,000 Btu/h – < 135,000 Btu/h	11.0 EER; 16.0 IEER; 3.5 COP at 47°F; 2.4 COP at 17°F; Percent of Heating Capacity at 17°F ≥ 60% of that at 47°F
Large CUHP	≥ 135,000 Btu/h – < 240,000 Btu/h	10.0 EER; 17.3 IEER; 3.5 COP at 47°F; 2.2 COP at 17°F; Percent of Heating Capacity at 17°F ≥ 60% of that at 47°F
Very Small VRF Air-Cooled Heat Pump	< 65,000 Btu/h	11.8 EER; 15.0 SEER; 9.5 HSPF2; 2.5 COP at 17°F; Percent of Heating Capacity at 17°F ≥ 70% of that at 47°F
Small VRF Air Cooled Heat Pump	≥ 65,000 Btu/h – < 135,000 Btu/h	11.8 EER; 17.4 IEER; 3.6 COP at 47°F; 2.5 COP at 17°F Percent of Heating Capacity at 17°F ≥ 70% of that at 47° F
Large VRF Air Cooled Heat Pump	≥ 135,000 Btu/h – < 240,000 Btu/h	10.9 EER; 16.4 IEER; 3.6 COP at 47°F; 2.5 COP at 17°F; Percent of Heating Capacity at 17°F ≥ 70% of that at 47°F

* VRF models must meet these requirements in ducted, ductless, and mixed configurations to be certified.

Note: EPA recognizes that there is a growing market for Light Commercial HVAC products that perform well in colder climates and proposes a separate set of requirements tailored to recognize those units capable of doing so. The proposed criteria are presented in Table 4 above.

Under this proposal, EPA would identify those models meeting Cold Climate requirements with a modified ENERGY STAR certification mark designating those units as “ENERGY STAR Cold Climate.”

In setting criteria for products with a cooling capacity ≥ 65,000 and <240,000 btu/h, EPA had a choice to highlight those that stand out by maintaining capacity at lower temperatures (as indicated by 17°F rated capacity/ 47°F rated capacity) versus those with higher COP at 17°F. EPA believes capacity maintenance to be critical for two reasons: (1) if models cannot maintain enough operating capacity at lower temperatures, they are more likely to be supplemented by gas or less efficient resistive-electric heat; and (2) an undersized unit without backup may run constantly if unsupported at very low temperatures and may yet still be incapable of providing desired comfort levels. However, EPA has included an alternate proposal (see *Appendix A: Alternate Proposal for ENERGY STAR Cold Climate*) that instead focuses on COP, in the hopes that stakeholders could comment on both options at once. Please note the final version of this specification will have only one set of requirements under which products can certify as ENERGY STAR Cold Climate – those in Table 4 and in Appendix A are *alternative possibilities for comment.*

For products with a cooling capacity < 65,000 btu/h, the proposed Cold Climate criteria focuses on increasing the required HSPF value and maintaining a satisfactory percent of heating capacity at 17°F. EPA does not have data explicitly outlining COP at either 47°F or 17°F, which would be needed to fully understand the relationship between COP and heating capacity and set criteria that guarantees efficient low ambient temperature performance. Due to this lack of data, there is no alternate proposal for these products. Note that if additional time is needed to settle on Cold Climate criteria, for instance as stakeholders share additional data for Very Small products, EPA may delay finalizing these sections of the specification, while going ahead with the rest. Stakeholders are invited to submit data regarding COP and capacity at 47°F and 17°F for products of this size for consideration.

VRF models tend to maintain operating capacity well in cold climates. As such, a wider array of product types, sizes and brands appear to meet the proposed criteria for the ENERGY STAR Cold Climate certification than for packaged roof top heat pumps. However, Gas/Electric Packaged CUHPs are common in cold and very cold climate zones, and EPA considers it critical to national decarbonization goals to identify those packaged CUHP models that perform best in these climates.

We note that 5°F data is not available and expect they would provide limited usefulness for packaged roof top units at this time.

Stakeholders are encouraged to provide specific feedback on this proposal, and on the alternative proposal in Appendix A. EPA is particularly curious whether higher COP at low ambient temperatures corresponds to higher temperature of delivered air.

C. Gas/Electric Package Units: To certify for ENERGY STAR or ENERGY STAR Cold Climate, a gas/electric packaged unit shall meet the appropriate requirements in Tables 1, 2, 3, or 4, above. Additionally, the gas furnace in the gas/electric packaged unit must be variable-capacity or capable of operating in at least 3 distinct stages.

Note: EPA proposes the requirements outlined in Section 3.C for Gas/Electric Package Units to incentivize the use of multi-capacity heating technologies that are known to increase heating efficiency and to promote efficiency gains for a major component of these products that is otherwise not addressed by this specification.

D. Refrigerant Type Reporting Requirement: Manufacturers shall indicate the type of refrigerant(s) used in products as part of the ENERGY STAR certification process.

Note: EPA proposes the additional requirement regarding refrigerant types as outlined in Section 3.D to align with refrigerant type reporting requirements recently added to other ENERGY STAR specifications.

E. Significant Digits and Rounding:

a. All calculations shall be carried out with actual measured (unrounded) values.

b. Unless otherwise specified in this specification, compliance with specification limit shall be evaluated using directly measured or calculated values without any benefit from rounding.

c. COP shall be expressed in multiples of the nearest 0.01.

d. IEER shall be expressed in multiples of the nearest 0.1.

e. Capacity shall be expressed as mentioned in Table 6, below.

Table 6: Rounding Requirements for Capacity

Capacity Ratings, Btu/h	Multiples, Btu/h
65,000 up to 135,000	1,000
136,000 up to 400,000	2,000

4) Test Requirements:

A. One of the following sampling plans shall be used for purposes of testing for ENERGY STAR certification:

a. A single unit is selected, obtained, and tested. The measured performance of this unit and of each subsequent unit manufactured must be equal to or better than the ENERGY STAR specification requirements. Results of the tested unit may be used to certify additional individual model variations within a basic model as long as the definition for basic model provided in Section 1, above, is met; or

b. Units are selected for testing and results calculated according to the sampling requirements defined in 10 CFR part 429, Subpart B § 429.43. The certified rating must be equal to or better than the ENERGY STAR specification requirements. Results of the tested unit may be used to certify additional model variations within a basic model as long as the definition for basic model provided in Section 1, above, is met. Further, all individual models within a basic model must have the same certified rating based on the applicable sampling criteria. This rating must be used for all manufacturer literature, the qualified product list, and certification of compliance to DOE standards.

B. When testing light commercial HVAC equipment, the following test method shall be used to determine ENERGY STAR certification:

Table 7: Test Method for ENERGY STAR Certification

Test Method Reference	System Type	ENERGY STAR Requirement
ANSI/AHRI 210/240-2023	All with Cooling Capacity <65,000 btu/h	EER, SEER
	All CUHP with Cooling Capacity <65,000 btu/h	HSPF
	Cold Climate CUHP with Cooling Capacity <65,000 btu/h	Capacity at 47°F, Capacity at 17°F
10 CFR part 431, Subpart F §431.96	All with Cooling Capacity ≥ 65,000 btu/h and < 240,000 btu/h	EER, IEER
	All CUHP with Cooling Capacity ≥ 65,000 btu/h and < 240,000 btu/h	COP at 47°F and COP at 17°F
	Cold Climate CUHP with Cooling Capacity ≥ 65,000 btu/h and < 240,000 btu/h	Capacity at 47°F, Capacity at 17°F
AHRI 1230-2014	All VRF with Cooling Capacity <65,000 btu/h	EER, SEER
	All VRF Heat Pumps with Cooling Capacity <65,000 btu/h	HSPF
	Cold Climate VRF Heat Pumps with Cooling Capacity <65,000 btu/h	Capacity at 47°F, Capacity at 17°F, COP at 17°F
	All VRF with Cooling Capacity ≥ 65,000 btu/h and < 240,000 btu/h	EER, IEER
	All VRF Heat Pumps with Cooling Capacity ≥ 65,000 btu/h and < 240,000 btu/h	COP 47°F
	Cold Climate VRF Heat Pumps with Cooling Capacity ≥ 65,000 btu/h and < 240,000 btu/h	Capacity at 47°F, Capacity at 17°F, COP at 17°F

Note: EPA has revised Table 7 to indicate which requirements need to be measured for each product type. This includes a clarification that SEER and IEER metrics for VRF equipment should be taken per AHRI 1230-2014.

5) Effective Date: The Light Commercial HVAC specification shall take effect on **January 1, 2023**. To be certified to ENERGY STAR, a product model shall meet the ENERGY STAR specification in effect on the model's date of manufacture. The date of manufacture is specific to each unit and is the date on which a unit is considered to be completely assembled.

Note: EPA intends to align the effective date of this specification with the compliance date of the new minimum efficiency standards. Manufacturers typically ask for such alignment, and the new standards are above current ENERGY STAR levels. To achieve this alignment, EPA expects to finalize this Version 4.0 specification in spring 2022.

6) Considerations for Future Revisions:

EPA reserves the right to change the specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through industry discussions. In the event of a specification revision, please note that the ENERGY STAR certification is not automatically granted for the life of a product model.

The following items are of interest to EPA and will be examined in future specification revisions.

A. Updated Criteria for Light Commercial VRF Multi-Split Systems: The U.S. Department of Energy is currently reviewing the test method and standard applicable to the VRF equipment covered by the scope of this specification as part of their revision process. Once available, EPA intends to begin development of updated criteria for VRF products to complement the updated regulations.

B. Cold Climate Performance: EPA seeks to further the recognition of high-efficiency products designed to operate in colder climates through the ENERGY STAR Cold Climate certification and intends to routinely update criteria to identify the top performing models in future specification development efforts. To the extent that newly developed test procedures might offer a standardized way of measuring performance at very low ambient temperatures, EPA is likely to propose the introduction of reporting requirements for such.

C. Controls Verification Procedure (CVP): EPA intends to introduce a CVP for products with variable compressor speeds to confirm that performance metrics measured at low ambient temperature test points are achieved by a unit's native controls operating as they would in a customer's home.

D. Automatic Fault Detection and Diagnostics: EPA understands that proper unit installation and maintenance is critical in sustaining efficient performance and seeks to explore how specification criteria can promote self-detection and diagnostic capabilities in Light Commercial HVAC equipment.

E. Decarbonization: EPA will continue to set program requirements that support national decarbonization strategies and benchmarks.

Appendix A: Alternate Proposal for ENERGY STAR Cold Climate

Table 8: Alt Energy-Efficiency Criteria for Certified Cold Climate Light Commercial Equipment*

Equipment Type	Cooling Capacity	Minimum Energy Efficiency Criteria
Very Small CUHP (Single Package)	< 65,000 Btu/h	No Alternate Proposal
Very Small CUHP (Split System)	< 65,000 Btu/h	No Alternate Proposal
Small CUHP	≥ 65,000 Btu/h – < 135,000 Btu/h	11.0 EER; 16.0 IEER; 3.6 COP at 47°F; 2.5 COP at 17°F; Percent of Heating Capacity at 17°F ≥ 50% of that at 47°F
Large CUHP	≥ 135,000 Btu/h – < 240,000 Btu/h	10.0 EER; 17.3 IEER; 3.6 COP at 47°F; 2.3 COP at 17°F; Percent of Heating Capacity at 17°F ≥ 50% of that at 47°F
Very Small VRF Air-Cooled Heat Pump	< 65,000 Btu/h	No Alternate Proposal
Small VRF Air Cooled Heat Pump	≥ 65,000 Btu/h – < 135,000 Btu/h	11.8 EER; 19.0 IEER; 4.0 COP at 47°F; 2.7 COP at 17°F; Percent of Heating Capacity at 17°F ≥ 70% of that at 47°F
Large VRF Air Cooled Heat Pump	≥ 135,000 Btu/h – < 240,000 Btu/h	10.9 EER; 16.4 IEER; 4.0 COP at 47°F; 2.6 COP at 17°F; Percent of Heating Capacity at 17°F ≥ 70% of that at 47°F

* VRF models must meet these requirements in ducted, ductless, and mixed configurations to be certified.

Note: The requirements outlined in Table 8 above are presented as an alternate proposal to the requirements outlined in Table 4. Where the requirements in Table 4 focus on identifying top performing models in terms of their percent of heating capacity maintenance at 17°F, the requirements in Table 8 focus on identifying those models with exceptional COP at 17°F and 47°F.

EPA's effort to balance requirements for a high COP and percent capacity maintenance at low temperatures has led to these two proposals instead of one hybrid proposal because most products that perform well in one regard do not fair as well in the other (although there are some VRF products that do). Following, if the percent capacity or COP requirements were increased in either proposal, a significant number of VRF products and all CUHP products would no longer meet the full set of requirements.

Note that the criteria for Very Small equipment with capacities < 65,000 btu/h does not change in this alternate proposal as analysis indicates that increasing the requirement for HSPF does not negatively impact the capacity maintenance of qualifying products, as is seen with larger sized categories. This may however be due to lack of COP data at 17°F and 47°F, which might indicate that the relationship between COP and percent capacity is actually similar to what is observed in larger size categories; EPA welcomes more information from stakeholders on this point.

Analysis of each proposal against the current AHRI directory also indicates several key insights:
1) Both target up to the top 9-17% of products (regarding cold climate performance) for each category;
2) Both allow for products that come in a range of different rated capacities;
3) Both allow for products from multiple manufacturers for VRF products; and
4) There will be significantly more VRF products than CUHP products that can meet requirements.

While EPA prefers the approach taken by the proposal outlined in Table 4 due to the previously described reasoning, the Agency understands that there may be advantages for focusing on higher COP requirements instead. EPA seeks input on the impact of cold climate criteria that focuses on higher COP values at the expense of heating capacity. Specifically, EPA requests feedback on how losing a significant percentage of heating capacity in an effort to gain modest COP improvements (e.g., lose 10% capacity on a product at 17°F but gain 0.2 COP at 17°F) affects the ability of a product to efficiently warm a space without backup equipment.