

Tech Note: New Federal Performance Rating Metrics

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Prior to 2023, the federal government established minimum seasonal efficiency requirements for residential air-source heat pumps and air conditioners based on the following metrics:

- Heating Seasonal Performance Factor (HSPF) is the total space heating required in U.S. climate region IV (mixed dry climate) during the space heating season, expressed in Btu, divided by the total electrical energy consumed by the heat pump system during the same season, expressed in Watt-hours.
- Seasonal Energy Efficiency Ratio (SEER) is the total heat removed from the conditioned space during the annual cooling season, expressed in British thermal units (Btu), divided by the total electrical energy consumed by the air conditioner or heat pump during the same season, expressed in Watt-hours.¹

Effective January 1, 2023, the federal government requires the rated energy efficiency of residential air-source heat pumps and air conditioners be determined using revised test procedures and new metrics.² The changes most significant for residential heat pumps include:

- Reporting rated seasonal performance using the new metrics HSPF2 and SEER2
- Adding a new, optional test condition for variable-speed heat pumps at 5°F
- Increasing blower discharge pressure (External Static Pressure) for most systems from 0.1 inches of water column (iwc) to 0.5 iwc.³

The motivation for these changes is to have metrics that better characterize in-service performance in typical U.S. installations.

Approximate relationships between the new and old metrics are:⁴

- Central ducted heat pumps:
 - HSPF2 ~ 0.85 HSPF
 - SEER2 ~ 0.95 SEER
- Ductless mini-/multi-split heat pumps:
 - HSPF2 ~ 0.95 HSPF
 - SEER2 ~ SEER.

As these relationships show, relative to the previous HSPF and SEER metrics, HSPF2 and SEER2 will lower the rated performance for central ducted heat pumps more than for ductless mini-/multi-split heat pumps.

¹ U.S. Department of Energy, Federal Energy Management Program, website:

https://docs.google.com/document/d/1_UZEUYvMZIR7NvPfcJhoFe2UttR9X0n1xS_CptIL3is/edit

² Federal Register/Vol. 82, No. 3/Thursday, January 5, 2017/Rules and Regulations; Department of Energy; 10 CFR Parts 429 and 430; Energy Conservation Programs: Test Procedures for Central Air Conditioners and Heat Pumps: <https://www.govinfo.gov/content/pkg/FR-2017-01-05/pdf/2016-30004.pdf>

³ ACCA HVAC Blog; 09/01/2022: <https://hvac-blog.acca.org/new-efficiency-ratings-seer2-getting-it-wrong/>

⁴ HVAC Partners for Success; 2023 Regulations: What you Need to Know: <https://hvacdist.com/2023regulations/>

The federal government has aligned its efficiency standards to these new performance metrics.⁵

The Mass Save sponsors are aligning their efficiency standards for residential air-source heat pumps with the new federal standards. ***To ease the transition to the new standards, the Mass Save sponsors will consider any heat-pump models that meet either the current criteria or the new criteria as eligible for installation through December 31, 2023.***⁶

The new ENERGY STAR Cold Climate Heat Pump designation requires that the COP at 5°F \geq 1.75 and that the Heating Capacity at 5°F \geq 70% of the Heating Capacity at 47°F.⁷ Also, the Northeast Energy Efficiency Partnerships (NEEP) now requires that manufacturers test products per the new test procedures to demonstrate compliance with the performance requirements for their Cold Climate Air Source Heat Pump (ccASHP) Product List (Version 4.0).⁸ NEEP does not specifically require testing at the new 5°F outdoor condition, but, if a system is tested at the 5°F condition, that performance should be reported.

⁵ *Upcoming Changes to Efficiency Standards for AC Units and Heat Pumps*; undated blog post; National Association of Home Builders. See:

<https://www.nahb.org/blog/2022/05/upcoming-changes-efficiency-standards-ac-units-heat-pumps>

⁶ Mass Save website:

<https://www.masssave.com/residential/rebates-and-incentives/air-source-heat-pumps/heat-pump-qualified-list>

⁷ ENERGY STAR Website:

https://www.energystar.gov/products/heating_cooling/heat_pumps_air_source/key_product_criteria

⁸ NEEP's Cold Climate Air Source Heat Pump List:

<https://neep.org/heating-electrification/ccashp-specification-product-list>