

Air Source Heat Pumps

Efficiency Ratings Explained: DOE Appendix M1



NYSERDA

What are EER2, SEER2, and HSPF2?

M1 testing procedure makes efficiency ratings more accurate to real-world performance.

The US Department of Energy (DOE) defines testing procedures and efficiency ratings for heat pumps and air conditioners. DOE Appendix M1 replaces Appendix M with a test procedure that determines a heat pump's efficiency ratings - EER2, SEER2, and HSPF2. Heat pumps manufactured after January 1, 2023 must have published M1 test results.

EER, SEER and HSPF → EER2, SEER2 and HSPF2

Manufactured before January 1, 2023	Effective Date	Manufactured on or after January 1, 2023
Appendix M	DOE Reference Appendix	Appendix M1
Test Procedure		
0.1-0.2 in. wc.	External Static Pressure	0.5 in. wc.
365 W/1000 cfm	Fan Power for Coil Only Units	441 W/1000 cfm
47°F and 17°F	Heating Test Conditions	47°F, 17°F, and 5°F
65°F	Heat Load Beginning Point	55°F
0.77	Building Load Line Slope	Non-variable speed: 1.15 Variable speed: 1.07
Efficiency Metrics		
EER	Energy Efficiency Ratio – peak cooling efficiency (at 95°F)	EER2
SEER	Seasonal Energy Efficiency Ratio – seasonal cooling efficiency	SEER2
HSPF	Heating Seasonal Performance Factor – seasonal heating efficiency	HSPF2
Minimum Efficiency Requirements - Residential North Region		
SEER ≥ 15 HSPF ≥ 8.8	Split System Heat Pump	SEER2 ≥ 14.3 HSPF2 ≥ 7.5
SEER ≥ 14 EER ≥ 11	Central ASHP Installed with Furnace	SEER2 ≥ 13.4 EER2 ≥ 10.6
SEER ≥ 14	Split System AC	SEER2 ≥ 13.4

Why did the DOE make this change?

The M1 testing procedure more accurately represents real-world performance and provides current data relevant to cold-climate performance.

Is there a correlation between the metrics?

No. Each heat pump responds differently to the changes in test procedure. Typically, ductless systems have M1 ratings that are the same or slightly lower than their prior M ratings and a ducted system's M1 ratings are more impacted due to greater external static pressure sensitivity.

Why are the M1 ratings lower values?

The M1 efficiency ratings are typically lower as a result of the testing procedure itself. The lower values do not imply a change in energy efficiency performance.

Why do some heat pumps list both ratings?

If a manufacturer is continuing production, they must test the product and list the M1 results. Some products will have the M1 efficiencies listed with a new AHRI number.



Heat pumps manufactured before 2023 **can be installed in all regions** if the heat pump qualified for installation when manufactured.



Air conditioners manufactured before 2023 **can only be installed in the North Region** if the air conditioner qualified for installation when manufactured.

NYS Clean Heat

Equipment eligibility for the NYS Clean Heat Program has not changed with the release of Appendix M1. ASHP systems must be listed on the NEEP Product List.

IRA 25C

The Inflation Reduction Act (IRA) of 2022 offers federal income tax credits for installing qualifying heat pump systems. Section 25C of the IRA's Energy Efficient Home Improvement Credit provides annual tax credits of up to \$2,000, which can lower the cost of a heat pump installation by up to 30%. To qualify for the 25C tax credits, the products must have published M1 test results and meet the Consortium for Energy Efficiency's (CEE) highest efficiency tier excluding the advanced tier for the North/Canada.

IRA 25C Eligibility - North Region Heat Pump

Configuration	SEER2	EER2	HSPF2	COP@5°F	Capacity Ratio
Ducted	≥ 15.2	≥ 10.0	≥ 8.1	≥ 1.75	≥ 58% at 17°F/47°F
Ductless	≥ 16.0	≥ 9.0	≥ 9.5	≥ 1.75	or ≥ 70% at 5°F/47°F

Where to Find M1 Efficiency Ratings?

All equipment manufactured after January 1, 2023 should come with M1 efficiency ratings. Those can be found on their AHRI data sheet, the manufacturer's product specifications, or for certain cold-climate heat pumps NEEP's ccASHP Product List. Some products list their M and M1 efficiency ratings on the same record, others have two distinct listings.



NEEP's ccASHP List:
<https://ashp.neep.org/>



AHRI Directory: <https://www.ahridirectory.org/Search/SearchHome?ReturnUrl=/>