Air Source Heat Pumps

Efficiency Ratings Explained: DOE Appendix M1

NEW YORK STATE | 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?

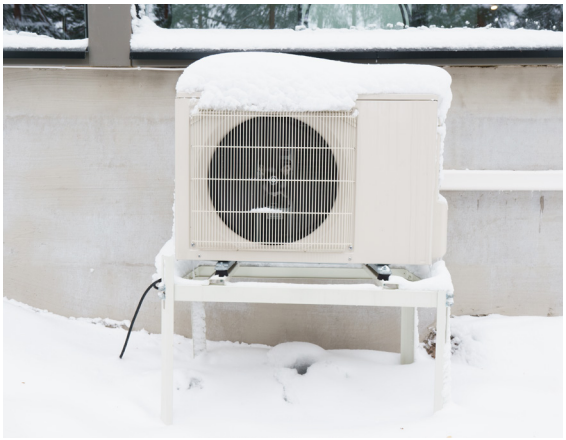
No. Each heat pump responds differently to the changes in test procedure. Typically, ductless systems have M1 ratings that are the same or slightly lower than their prior M ratings and a ducted system's M1 ratings are more impacted due to greater external static pressure sensitivity.

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.



Systems Without M1 Ratings

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.

How Does M1 Affect Tax Credits and Incentives?

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. You can rely on the manufacturer's certification that a product is a qualified energy property for purpose of taking the credit.

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 **or** ≥ 70% at 5°F/47°F
Ductless	≥ 16.0	≥ 9.0	≥ 9.5	≥ 1.75	

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=/