

2023 HVAC STANDARDS (SEER2)

The Department of Energy (DOE) is changing the way HVAC systems are tested. **Effective January 1, 2023**, new M1 testing procedures will require a lower Seasonal Energy Efficiency Ratio (SEER) to lower energy costs for consumers and decrease carbon emissions. This change applies to:

- Air Conditioner Condensing Units
- Heat Pumps
- Single Packaged Units
- Evaporator Coils
- Gas Furnaces



UNDERSTANDING SEER

What is SEER?

SEER, or Seasonal Energy Efficiency Ratio, is the standard measure of efficiency for central air conditioning systems. SEER is the ratio of total cooling capacity during normal periods of operation divided by the total electric energy input over that same period. The higher the SEER, the more efficient the system.

How does a homeowner compare the cost of operating an air conditioning unit based upon SEER rating?

Equation:

$$\text{Capacity (BTU)} \div \text{SEER Rating} = \text{Watts} \times \text{\#Hours Running} = \text{kWh} \times \text{Electricity Cost} = \text{Operating Cost}$$

Example:

AIR CONDITIONER COST CALCULATOR	14 SEER RATING	15 SEER RATING	VARIANCE
BTU	36,000	36,000	0
SEER RATING	14	15	+1
WATTS	2,571	2,400	-171
# HOURS RUNNING (est. 8 hours x 120 days=960)	960	960	0
KILOWATT TOTAL HOURS	2,468	2,304	-171
ELECTRICITY COST (NOV 2021 South Atlantic: eia.gov)	0.1256	0.1256	0
TOTAL OPERATING COST FOR 960 HOURS	\$309.98	\$289.38	-\$20.59

Energy cost savings of **7%** can be realized by selecting a 15 SEER Rated A/C Unit versus a 14 SEER rated unit.

Why does SEER rating matter to the consumer?

The higher the SEER rating, the less electricity is needed for a central air conditioning unit to do its job. By increasing 1 SEER from 14 to 15, your customer can see their air conditioning expense drop by as much as 7%! This higher rating saves money and the environment by reducing CO2 emissions.

- 64% of homes use central air conditioning and 11% use heat pumps for heating or cooling
- DOE calculates that in total households using central air conditioners or heat pumps will collectively save up to \$12.2B during the 30 years after implementation
- Different regions have higher standards, especially the southeast and southwest, where cooling loads are a larger share of home energy use

What is the current SEER standard?

For air conditioners, The U.S. Department of Energy (DOE) has a minimum energy conservation standard of 13 SEER in the north and 14 SEER in the south under the current test procedures.

SEER2 PROTOCOL - NEW STANDARDS IN 2023

What changes with SEER2?

SEER2 Protocol requires a seasonal energy efficiency ratio (SEER)—a measure of a system's cooling performance—of at least a 14 SEER for residential systems in the northern part of the United States and 15 SEER in the southern part of the United States, where cooling loads are a larger share of home energy use. To support this, HVAC manufacturers will be required to comply with a new testing procedure for developing efficiency ratings. This new testing procedure (M1) ensures units are tested to better reflect field conditions of installed equipment. Most importantly, higher SEER ratings indicate more energy-efficient equipment.

What products are affected by the SEER2 Protocol?

- Air Conditioner Condensing Units
- Heat Pumps
- Single Packaged Units
- Evaporator Coils
- Gas Furnaces

Timing for Rollout:

Air conditioning Systems:

North Region, any 13.0 SEER AC built before January 1, 2023, can still be installed on or after January 1, 2023.

Southeast and Southwest Regions, any AC that does not meet the minimum requirements cannot be installed on or after January 1, 2023.

Heat Pump Systems:

Any 14.0 SEER heat pump built before January 1, 2023, can still be installed on or after January 1, 2023.

SEER2 Standards by Region and product type

Table I-1—Amended Energy Conservation Standards for Residential Central Air Conditioners and Heat Pumps Based on the DOE Test Procedure at the Time of the 2015-2016 Negotiations (Recommended TSL)

Product Class	National		Southeast*	Southwest**	
	SEER	HSPF	SEER	SEER	EER
Split-System Air Conditioners with a Certified Cooling Capacity <45,000 Btu/h	14		15	15	*** 12.2/10.2
Split-System Air Conditioners with a Certified Cooling Capacity ≥45,000 Btu/h	14		14.5	14.5	*** 11.7/10.2
Split-System Heat Pumps	15	8.8			
Single-Package Air Conditioners†	14				11.0
Single-Package Heat Pumps†	14	8.0			
Space-Constrained Air Conditioners†	12				
Space-Constrained Heat Pumps†	12	7.4			
Small-Duct High-Velocity Systems†	12	7.2			

<https://www.federalregister.gov/documents/2017/01/06/2016-29992/energy-conservation-program-energy-conservation-standards-for-residential-central-air-conditioners>

* Southeast includes: The states of Alabama, Arkansas, Delaware, Florida, Georgia, Hawaii, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, Puerto Rico, South Carolina, Tennessee, Texas, Virginia, the District of Columbia, and the U.S. territories.

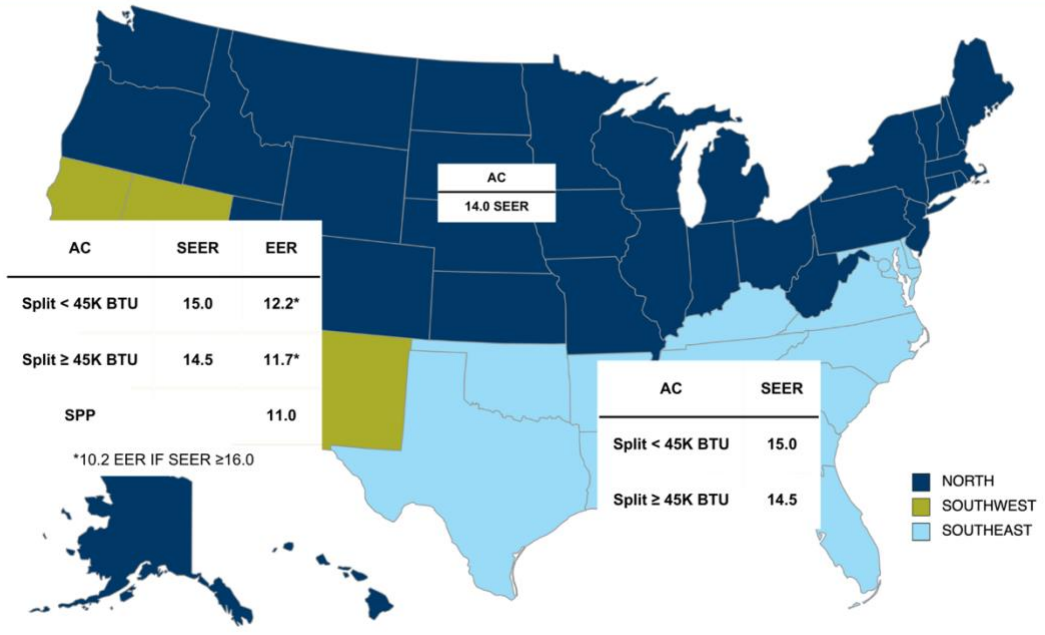
** Southwest includes the states of Arizona, California, Nevada, and New Mexico.

*** The 10.2 EER amended energy conservation standard applies to split-system air conditioners with a seasonal energy efficiency ratio greater than or equal to 16.

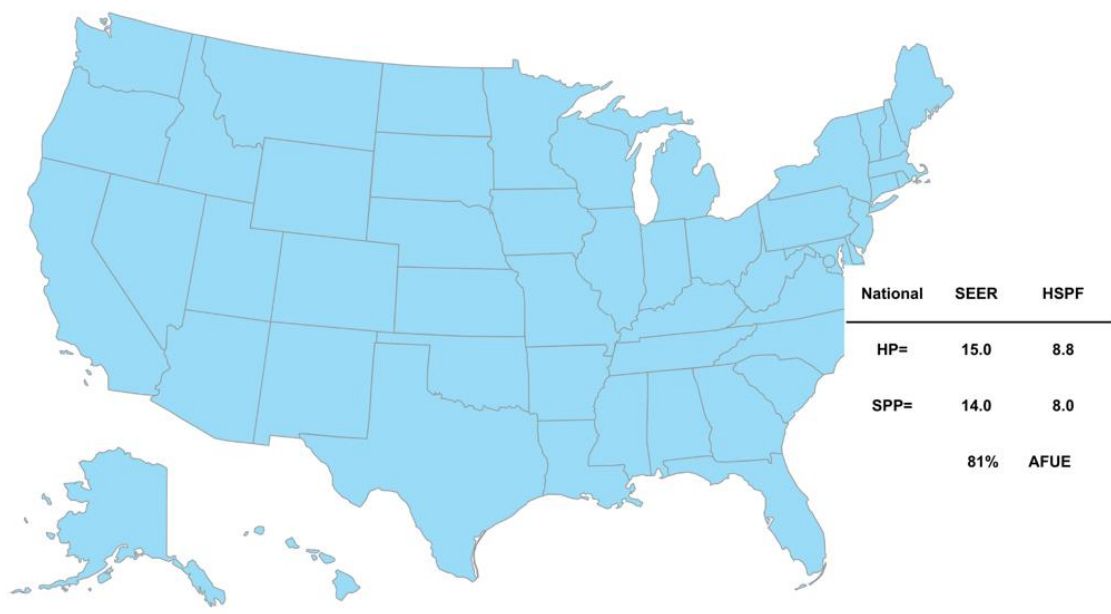
† The energy conservation standards for single-package, small-duct high-velocity and space-constrained product classes remain unchanged from current levels.

By Region / State:

2023 Regional Efficiencies for AC Units



2023 National Standards for HP and SPP Units



SEER2 Ratings and Minimum Efficiency Impact on current SEER Ratings:

The new SEER2 ratings will be lower, and the minimum efficiencies will be reduced to accommodate the more stringent test procedures, compared to the SEER ratings on the same system.

For example: the North region's 14.0 SEER minimum efficiency under the current test procedure will become a 13.4 SEER2 under the new test procedure.

The following Regional and National Standards' grids show the difference between the two testing protocols of SEER and SEER2:

2023 Regional Standards – Split Systems Air Conditioners:

Split System Air Conditioners – 2023 Regional Standards						
System Type	North Region		Southeast Region		Southwest Region	
	New SEER	New SEER2	New SEER	New SEER2	New SEER	New SEER2
Split System ACs (AC < 45 Btu/h)	14.0 SEER	13.4 SEER2	15.0 SEER	14.3 SEER2	15.0 SEER and 12.2 EER*	14.3 SEER2 and 11.7 EER2**
Split System ACs (AC ≥ 45 Btu/h)	14.0 SEER	13.4 SEER2	14.5 SEER	13.8 SEER2	14.5 SEER and 11.7 EER*	13.8 SEER2 and 11.2 EER2**
					*10.2 EER if SEER ≥ 16.0 SEER	**9.8 EER if SEER2 ≥ 15.2 SEER

2023 National Standards – Split System Heat Pump:

Split System Heat Pump – 2023 National Standards		
System Type	National Efficiency Standard	
	New SEER & HSPF	New SEER2 and HSPF2
Split System HPs	15.0 SEER & 8.8 HSPF	14.3 SEER2 & 7.5 HSPF2

2023 National Standards – Packaged Systems*:

Packaged System – 2023 National Standards		
System Type	National Efficiency Standard	
	New SEER & HSPF	New SEER2 and HSPF2
Packaged ACs, Heat Pumps, Gas Electrics, & Dual-Fuel HPs	14.0 SEER & 8.0 HSPF	13.4 SEER2 & 6.7 HSPF2

*No changes to packaged systems standards, but they must meet the new testing procedures and standards.

Why do different regions have different standards?

Southeast and Southwest have higher standards since their cooling loads are a larger share of home energy use.

What are the M1 testing procedures?

M1 testing procedures increase the systems external static pressure from current SEER (0.1" of water) to SEER2 (0.5" of water).

By January 1, 2023, manufacturers of single-split systems must validate an AEDM that is representative of the amended M1 test procedure by:

- Testing a single-unit sample for 20-percent of the basic models certified
- The predicted performance as simulated by the AEDM must be within 5% of the performance resulting from the test of each of the models
- Although DOE will not require that a full complement of testing be completed by January 1, 2023, manufacturers are responsible for ensuring their representations are appropriate and that the models being distributed in commerce meet the applicable standards (without a 5% tolerance).

By January 1, 2023, manufacturers of multi-split, multi-circuit, or multi-head mini-split systems must determine representative values for each basic model through testing and the applicable sampling plan.

By July 1, 2024, each model of condensing unit of split system CAC/HP must have at least 1 combination whose rating is based on testing using the M1 test procedure and the applicable sampling plan.

Why are the M1 testing procedures established and SEER2 standards updated?

Goal of the new M1 testing procedure is to replicate real-world conditions to better reflect the true system's performance.

New terminology is added to communicate M1 ratings:

Seasonal Energy Efficiency Ratio 2 (SEER2): Measures energy efficiency usage over time. SEER2 is the total heat removed from the conditioned space during the annual cooling season, expressed in Btu, divided by the total electrical energy consumed by the air conditioner or heat pump during the same season, expressed in watt-hours.

Heating Seasonal Performance Factor 2 (HSPF2): Determine the efficiency of heat pump systems, so the higher the HSPF rating, the more efficient the heat pump. HSPF2 is the total space heating required in region IV 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.

Energy Efficiency Ratio 2 (EER2): Measures how efficiently a system will operate based on specific temperatures outside and takes into account humidity removal. EER2 shows how an air conditioner performs under maximum cooling load. EER2 is the ratio of the average rate of space cooling delivered to the average rate of electrical energy consumed by the air conditioner or heat pump. This ratio is expressed in Btu per watt.h (Btu/W.h.)

Difference between EER2 and SEER2: The Energy Efficiency Ratio (EER) measures a snapshot of a moment in time, whereas the Seasonal Energy Efficiency Rating (SEER) measures usage over time. Because of this, SEER represents a more important number to pay attention to for long-term energy usage.

Compliance is NOT an option – DOE WILL aggressively enforce

The DOE aggressively enforces efficiency standards in a number of industries, including HVAC, and violations can be costly.

- Dealers and contractors caught installing non-compliant equipment will be forced to replace the equipment at their cost. Repeat violators can be put on a national do-not-sell list.
- Distributors are subject to the same do-not-sell penalty if they knowingly and repeatedly supply non-compliant equipment to contractors who install that equipment in violation of the regional minimum.
- Any distributor or contractor identified as a routine violator will be prohibited from purchasing any of the seven classes of products identified in the Code of Federal Regulations, 10-CFR-430.32.

- Manufacturers knowingly selling non-compliant equipment will also face stiff fines, for example:
 - Guangdong Chigo Air Conditioning (2107) distributed 3,677 non-compliant split system central air conditioner; paid \$735,400 (\$200/unit)
 - Friedrich Air Conditioning Co. (2015) paid almost \$1.5 million on 8,000 noncompliant units (\$187/unit)
 - LG Electronics (2014) distributed 7,000 + non-compliant room air conditioners; paid > \$1.4 million (\$200/unit)

As with other regulations, the DOE will allow easy and confidential reporting of suspected violations and will make every effort to investigate credible complaints. In addition, manufacturers will be obligated to report any potential violations they identify or become aware of to the DOE within 15 days of discovery.

Record Keeping Critical in 2023

Dealer/contractors, distributors, and manufacturers will all be required to track the following to protect themselves in the event of a DOE investigation:

- Model and serial numbers of equipment sold, delivered, and installed, including the delivery addresses and installation locations
- Records will need to be kept for up to 60 months, depending on the type of business:
 - Dealers / contractors – 48 months
 - Distributors – 54 months
 - Manufacturers – 60 months

OTHER RESOURCES

U.S. Department of Energy – [Energy.gov](https://www.energy.gov)

U.S. Environmental Protection Agency – [Epa.gov](https://www.epa.gov)

EPA and DOE Energy Efficiency – [Energystar.gov](https://energystar.gov)

U.S. Government's national archives – [Federalregister.gov](https://www.federalregister.gov)