



## Old HVAC

We hear it all the time. “If it ain’t broke, don’t fix it!” So often we inspect houses with furnaces, heat pumps, air conditioners or boilers that are at or past their serviceable lives. The systems may be heating or cooling the house, so they are not technically “defective.” However, we will usually recommend the systems be replaced as soon as possible.

### Why Replace a Working System?

It’s certainly an option to keep running an old system until it fails. After all, it’s working! But what you probably don’t think about is that older systems, even those from just ten years ago, can use a lot more energy than newer systems. Really old systems can use nearly twice the energy as newer ones!

### Alphabet Soup: SEER, EER, COP, HSPF and more

There are a lot of acronyms in the HVAC industry (which is itself an acronym for Heating, Ventilation, and Air Conditioning). One of the most common terms is SEER, which stands for Seasonal Energy Efficiency Ratio. It is most commonly used in the energy ratings for heat pumps, and is the ratio between the total energy (BTU/hour) required for an average cooling season, divided by the total electrical energy (watts) required for that season.



*This match contains 1 BTU (British Thermal Unit) of energy. An 80,000 BTU furnace is burning the energy equivalent of 80,000 matches every hour.*

In 1992 the Department of Energy established 13 SEER as the minimum allowable efficiency. Before that, units were typically 10 SEER or lower. In 2015, the minimum was raised to 14 SEER for all air conditioners, split systems, heat pumps, and package systems.

EER stands for Energy Efficiency Ratio. It’s a lot like SEER, except it is only used as a measure of energy required for cooling. It is also measured during a specific set of conditions at a testing facility, so real-life conditions may mean big differences in actual performance.

COP stands for Coefficient Of Performance. It can be used for both heating and cooling efficiency measurements.

HSPF (Heating Seasonal Performance Factor) is the heating equivalent of the SEER.

### How Much Can I Save?

Many factors come into play when figuring out your expected savings. Things like insulation levels, number of windows, and even your preferred thermostat settings can all affect heating and cooling costs.

In Climate Zone 2, which includes all of Maryland, the average annual cost per square foot of residential heating and cooling for varying SEER/HSPF ratings is shown in the following table:

SEER/HSPF	\$/ft <sup>2</sup>
6/6	0.9
8/7	0.8
10/7	0.65
13/8	0.58
14/8	0.52
16/9	0.5
18/10	0.48
20/10	0.45

For example, for a 2500 square foot house with a 13 SEER heat pump, you could expect to pay about \$1450 annually for heating and cooling. By upgrading to an 18 SEER unit, you could reduce those costs to \$1200. The older the unit you're replacing, the greater the savings.

Most manufacturers offer units with SEER ratings ranging from 14 (the new minimum) all the way up to as high as 21, with most falling in the 16-18 range.

### It's Not Just About Efficiency

One of the biggest issues with older cooling and heat pump systems is that they use a coolant that is no longer readily available. R-22 coolant, commonly known by the trade name Freon, was found to be hazardous to the earth's protective Ozone layer. In 1987, the Montreal Protocol was put into place, which called for a gradual reduction in R-22 production. By January 2015, the US was required to reduce its consumption of R-22 by 90%; by 2020 the reduction should be nearly 100%. After that, the only R-22 that will be available will be refrigerant that has been recovered from existing systems, and will be permitted to be used to service existing systems. It is expected that the cost will become astronomical as supplies dwindle.

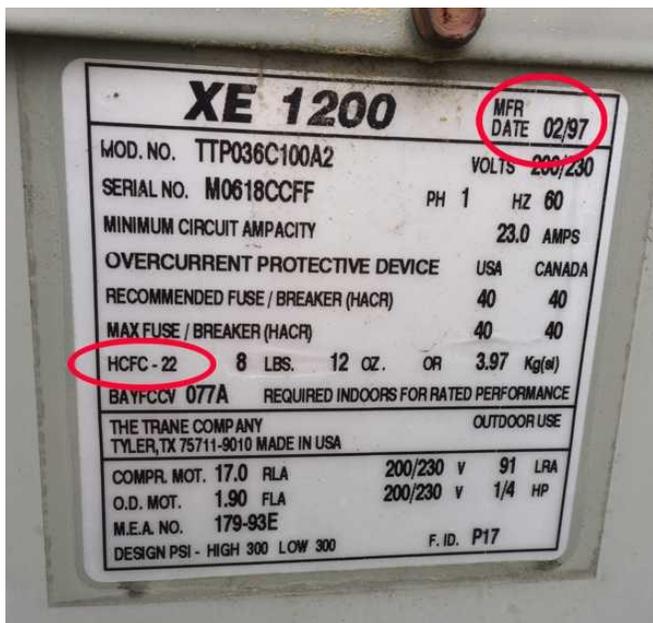
So can't an older unit simply have the R-22 replaced with its more environmentally-friendly R-410A? Unfortunately, no. The two coolants have components that prevent them from being interchangeable; R-22 uses a

mineral oil lubricant, while R-410A uses a polyester oil. Adding R-410A to a system that had R-22 in it forms an acid that will eat away the tubing inside the system, causing a total failure. While an older system could, in theory, be retrofitted for the newer coolant, it is much more cost-effective in the long run to simply replace the entire system.

### Newer Systems, Newer Features

Every year there are new features and innovations in HVAC equipment, such as multi-speed fans and intelligent processors that calculate heating and cooling needs based on outdoor temperature and humidity levels. Newer systems are also much quieter than older models.

If you do decide to replace your system, don't simply replace the old unit with one the exact same size. Ask that your HVAC company performs a full "Manual J" calculation. This method calculates the proper size unit for your house based on a long list of measurements and data, including such factors as color of the roof, what kind of landscaping exists around the house, and the type, size, and location of every single window and door. Only with this information in hand can a company accurately calculate the proper size system for your house.



*This 12 SEER unit was manufactured in 1997 and uses R-22 refrigerant. The average serviceable life of a unit like this is about 16 years, so this is already past its end of life.*



*This 13 SEER unit was manufactured in 2011 and uses the newer R-410A refrigerant. The seller claimed the system had been replaced in 2014; it's possible that a "new old stock" unit was installed.*