Implications of Replacing 8-10 SEER Outdoor Units with 13+ SEER Outdoor Units

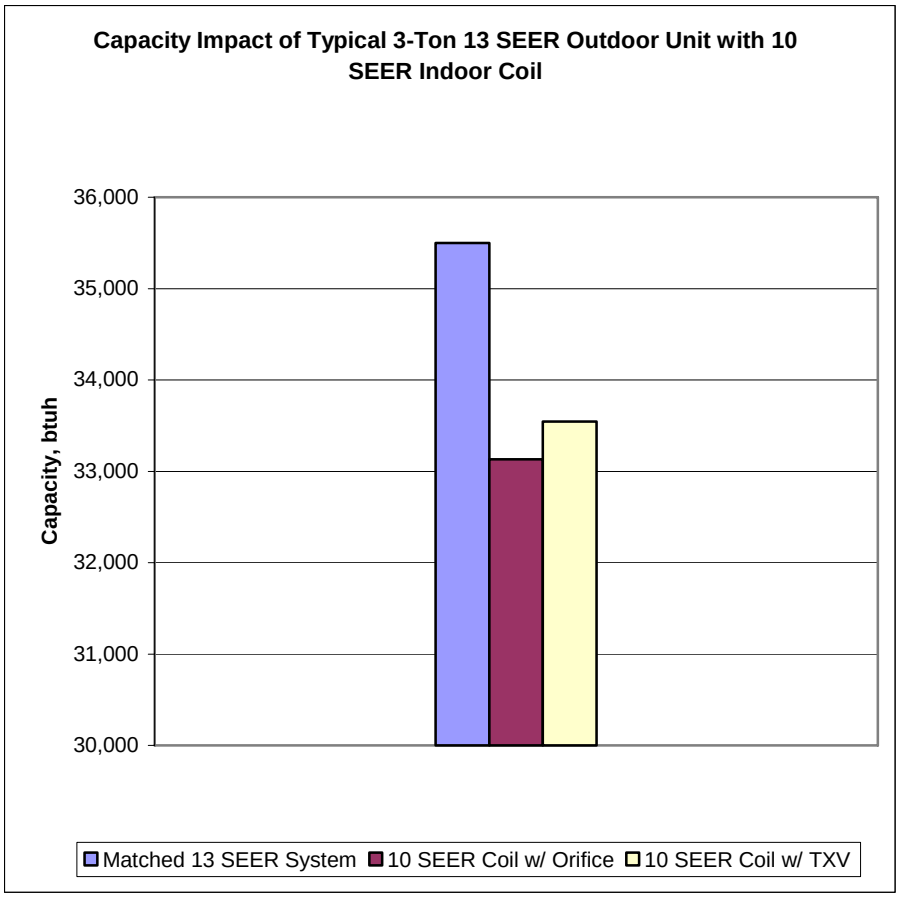
The size relationship between the indoor coil, outdoor coil, and compressor are significantly different for 13 SEER and higher systems compared to 8 - 10 SEER systems. Larger evaporators and condenser coils are used along with smaller compressors to achieve 13 SEER. Almost all 13+ SEER systems utilize thermostatically controlled refrigerant metering devices known as thermostatic expansion valves (TEV or TXV) as opposed to fixed restrictor metering devices (capillary tubes or orifices) commonly used on lower efficiency systems. Since indoor and outdoor coils for 13 SEER systems are on average 30% larger than for 10 SEER systems, changing the indoor coil to one matched with the new 13+ SEER outdoor unit is highly recommended when replacing 10 SEER and lower outdoor units. Retaining the old smaller fixed restrictor indoor coils when installing a new 13+ SEER outdoor unit results in significant operational and reliability issues including, but not limited to 7 - 15% capacity loss, 10 - 20% efficiency loss, and premature compressor failure. Installing a TXV on the existing indoor coil may increase compressor reliability on cooling only systems and may reduce the capacity loss to about 7% and reduce the efficiency loss to about 5%. Again, replacing the indoor coil to one matched to the outdoor unit per the manufacturer's specifications is recommended to assure the system operates as designed.

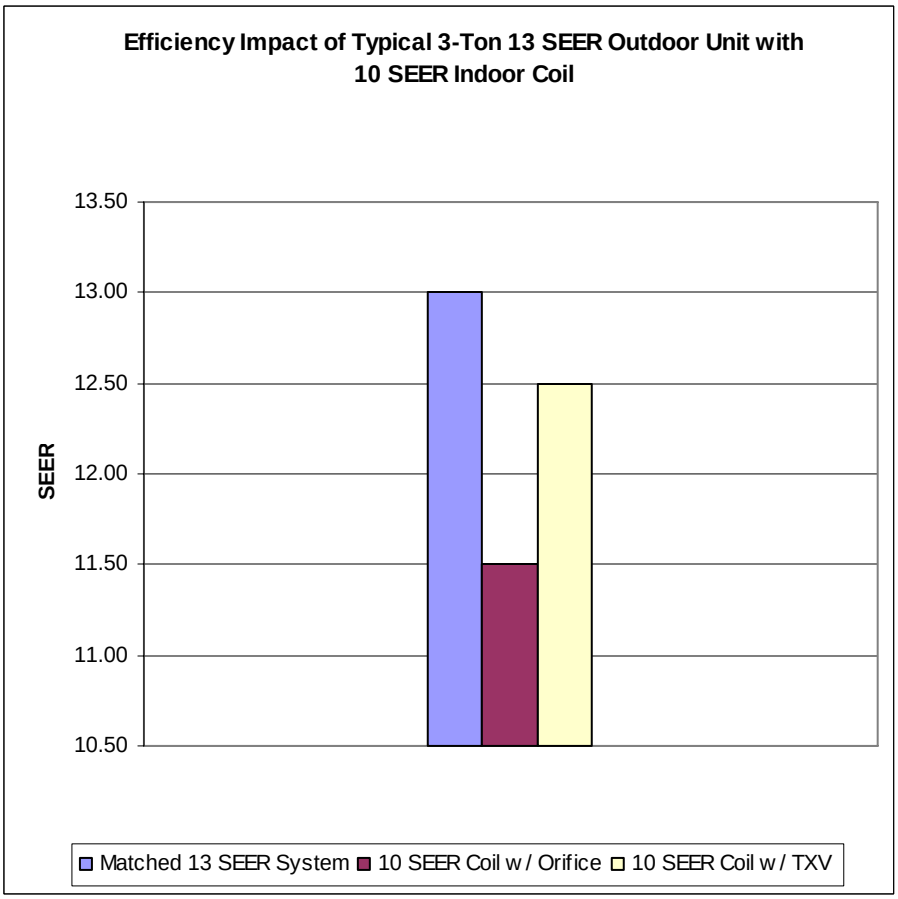
Heat pumps must have the proper refrigerant charge and coil sizes in both the cooling and heating modes for reliable and efficient operation. Retaining the old small indoor coil when replacing the heat pump outdoor section with a new 13+ SEER model will result in an over-charged condition in the heating mode which can cause nuisance tripping of the high pressure switch (if so equipped), compressor internal protector tripping, and premature compressor failure. Retaining the old coil also significantly decreases capacity and efficiency in both the cooling and heating modes. All major equipment manufacturers require the indoor coil and the heat pump outdoor section to be matched as shown in their product sales literature.

Summary/Recap

The use of properly matched indoor and outdoor 13+ SEER equipment provides reliable operation and the rated capacity and efficiency. The effect of retaining the existing indoor coil when replacing the outdoor section with a 13+ SEER model is the same regardless of brand of equipment. 10 SEER indoor coils may be used with 13+ SEER condensing units (cooling only) only if a TEV/TXV is installed on the coil, although there will be performance loss (approximately 7% capacity and 5% efficiency loss) and reduced reliability. For heat pumps, the indoor coil must be replaced with one matched to the new 13+ SEER outdoor section as recommended by the manufacturer.

The following graphs show the difference between replacing the entire system or just the outdoor unit.


Capacity Impact of Typical 3-Ton 13 SEER Outdoor Unit with 10 SEER Indoor Coil
36,000
35,000
34,000
33,000
32,000
31,000
30,000
Capacity, btuh
Matched 13 SEER System
10 SEER Coil w/ Orifice
10 SEER Coil w/ TXV


Efficiency Impact of Typical 3-Ton 13 SEER Outdoor Unit with 10 SEER Indoor Coil
13.50
13.00
12.50
12.00
11.50
11.00
10.50
SEER
Matched 13 SEER System
10 SEER Coil w / Orifice
10 SEER Coil w / TXV