Contractor Service Tips

Tip Card 26

Quick Facts - TXVs and SEER

Q: What Increase in SEER rating is achieved going from a flow-rater (fixed metering device) to an expansion valve, provided all else stays the same?

To explain why a system's SEER rating is improved by using a Thermal Expansion Valve (TXV) instead of a fixed orifice device we need to first understand how the SEER is determined. The SEER (Seasonal Energy Efficiency Ratio) is a measure of how efficiently an Air Conditioner or Heat Pump will operate over an entire cooling season instead of only a single operating condition.

For single speed systems, the SEER is calculated as follows:

$SEER = EER_b * (1 - C_d/2)$

Where:

EER_b = Energy Efficiency Ratio at 95/75F (DB/WB) Outdoor Temp and 80/67F Indoor Temp

C_d =Cyclic Degradation Coefficient determined through two dry coil tests (one steady state, the other cyclic). This factor quantifies the Part Load (cycling) efficiency of the system.

EMERSON
Climate Technologies

In order to improve SEER, it is important to keep the C_d as low as possible. This can be achieved by minimizing the amount of refrigerant entering the evaporator during the 'off' cycle. With a fixed orifice device, the high and low sides of the system equalize during the off cycle resulting in a high C_d. In comparison, a non-bleed TXV closes tightly when the compressor shuts off preventing equalization and thereby minimizing the C_d. It is for this reason, that TXVs will typically increase the rating of a HVAC system by approximately 0.5 SEER.

It should be noted that a system can be designed with a fixed orifice and liquid line solenoid to achieve a SEER rating equal to that with a TXV. However, such a system would not be as efficient over the entire operating range of the equipment as it would with a TXV. The TXV regulates the flow of refrigerant to maximize the efficiency of the evaporator at all operating conditions, whereas a fixed orifice can only be optimized at one particular condition. For this reason, if energy efficiency is the goal, a system incorporating a TXV should be specified.

Form No. 2005FC-262 Issued 1/06