

TROUBLESHOOTING THE REFRIGERANT SYSTEM WITH SUPERHEAT & SUBCOOLING

(For those who need a refresher on what superheat & subcooling are, read the article, Superheat & Subcooling Made Easy, also in the “For Your Interest” section)

- **Troubleshooting is a matter of temperature differences.**
 - Superheat is a temperature differential
 - Subcooling is a temperature differential
 - Evaporator entering air versus leaving air temperature is a differential.
 - Condenser entering air versus leaving air temperature is a differential.
 - These four temperature differentials are the critical measurements used to determine all refrigerant related problems. Often a manifold gauge set is not even necessary.

- **Critical Temperature Differentials**
 - Air temperature drop over the evaporator should not exceed 20 degrees F.
 - Air temperature rise over the condenser should not exceed 30 degrees F.
 - The low side superheat should be between 20 and 30 degrees.
 - The condenser subcooling should not exceed 15 degrees.

- An air temperature drop over the evaporator greater than 20 degrees indicates low evaporator airflow.
- An air temperature rise over the condenser greater than 30 degrees indicates low condenser airflow.
- A low side superheat less than 20 degrees indicates too much liquid refrigerant is in the low side.
- A low side superheat greater than 30 degrees indicates too little refrigerant is in the low side.
- A condenser subcooling exceeding 15 degrees indicates too much liquid refrigerant is in the high side.
- Comparing these readings will lead to an understanding of what is wrong with the system. For example, assuming adequate airflow over both the evaporator and condenser the following is true.
 - High superheat with high condenser subcooling indicates a restriction. Too much liquid is in the high side and too little in the low side.
 - Low superheat with high subcooling indicates an overcharge. Too much liquid on both sides.
 - High superheat with low condenser subcooling indicates an undercharge. Not enough liquid on either side.

Low side superheat and condenser subcooling simply tell us where the refrigerant is located. Too much refrigerant on the high side and too little on the low side indicates a restriction. Too much on both sides indicates an overcharge and not enough on either side indicates an undercharge.

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