777 EDUCATION AND CONSULTING, INC.

ISSUE 3 VOLUME 3

HVAC SOLUTIONS

MAY 2007

Critical Charging - TXV's

SAFETY

Working with refrigerants and electricity can be dangerous. High pressure refrigerants, gasses, and dangerous voltages pose a real threat to health, life, and property. Follow all manufacturer, OSHA, and local safety precautions. Be sure to wear eye and skin protection.

Charging Systems With Thermostatic Expansion Valves *(TXV/TEV)*

Generally, units using a TXV for a metering device require the technician to check the charge by measuring the subcooling which occurs in the condenser, however, follow manufacturer's directions if available.

Remember

Subcooling = Saturated condensing temperature – Liquid line temp. at condensing unit

Saturated condensing temp. is head pressure in psig converted to temperature for the refrigerant used.

Liquid line temp. is the actual temp. of the liquid line near where you are taking the head pressure (at the outlet of the condenser coil). Fully insulate the temperature probe.

Checking Charge Using Subcooling

Proper flow is required across the evaporator and condenser.

Run unit for 10-15 minutes before attempting to measure or alter a refrigerant charge.

Use manufacturer's charging procedure if known. If not known, the following will be helpful.

- Be certain that a TXV exists and not a capillary tube of piston metered evaporator. If the evaporator uses capillary tubes or a piston to meter refrigerant you must use the superheat method of charging
- Determine the design subcooling for the condensing coil. if air cooled. It is often on the rating tag of the condenser on newer units. If the design subcooling is not available the design subcooling is probably 10 to 15 degrees but may be higher for high efficiency units.

If actual subcooling is higher than manufacturer's specs., the unit is overcharged. Refrigerant must be recovered.

If actual subcooling is lower than specs., the unit is undercharged. Refrigerant must be added. *Tolerance is ± 3^{O}F.*

EXAMPLE

You are servicing a unit which contains R-22. Your head pressure is 200 psig. Temperature of the liquid line leaving the condensing coil is 89 degrees F. The nameplate on the condensing unit indicates that subcooling of 12 degrees is correct when the metering device is a thermostatic expansion valve.

Air flows through the condensing unit and evaporator are found to be accurate.

SC = SCT— LLT

Where:

SC is subcooling
SCT is saturated condensing temperature
LLT is liquid line temperature

Subcooling in our example = $101^{O}F - 89^{O}F$
$= 12^{O}F$

Measured subcooling equals required subcooling. Unit is properly charged.

Important: *SCT is head pressure converted to saturated temperature using the appropriate temperature/ pressure chart. Head pressure of* ***200 psig*** *is found to have a saturated condensing temperature (SCT) of* ***$101^{O}F$****.*

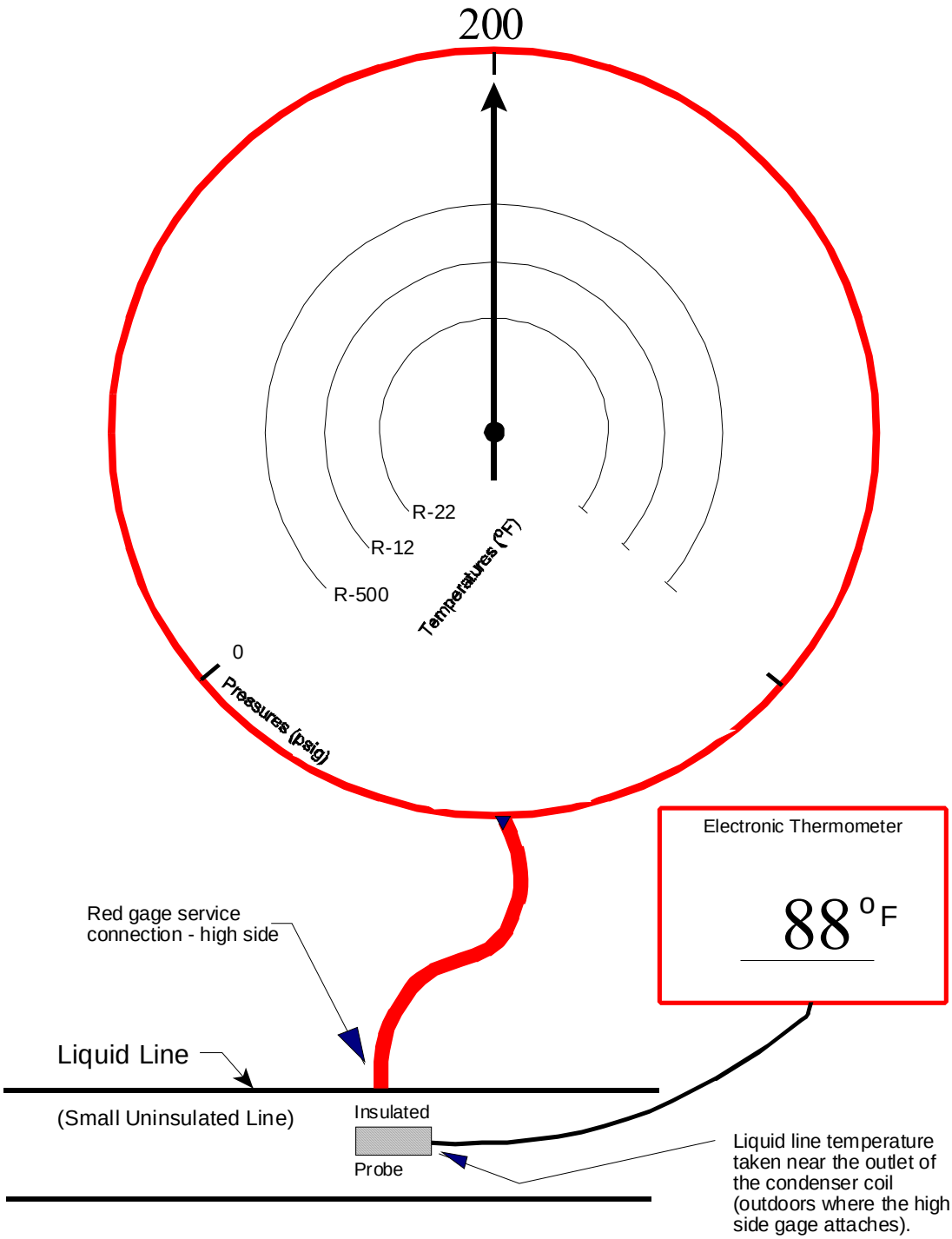
Drawing on page 3 provides more detailed information on the example.

Seminars Coming Soon

- *Critical Charging*
- *TXV Operation & Troubleshooting*
- *R-410a Certification*
- *EPA Refrigerant Certification*
- *Electric Meter Use In HVAC/R*
- *ECM Motor Service*
- *Compressor Diagnostics*
- *Venting System Design*
- *Basic Electricity I & II*
- *Carbon Monoxide*
- *Heat Pumps*
- *Hot Water Boilers*
- *HVAC Schematics*
- *Oil Burners*
- *Steam Boilers*
- *Michigan Commercial Energy Code*
- *Rooftop Unit Service*
- *Hot Surface & Spark Ignition Systems*
- *Gas Heating Service Basics*

Complete Behler-Young training schedules are available at:

www.behler-young.com/dealertraining.htm



Calculating Subcooling – used to charge TXV/TEV metered evaporator coil systems.