CONFIRMING SYSTEM CHARGE LEVEL AND ADDITIONAL DIAGNOSTIC TIPS FOR TESTING TXV SYSTEMS

Evaporator Superheat Cannot be Used to Determine TXV System Charge Level

The refrigerant charge level on a TXV system cannot be accurately determined by measuring evaporator superheat as it can on a CCOT system. By design, the TXV tries to maintain the appropriate level of superheating in the evaporator and increases or decreases refrigerant flow to match the heat load on the system. As the refrigerant charge level drops in a system due to a leak or from normal refrigerant loss as the system ages, the TXV will increase refrigerant flow to maintain evaporator superheat within specification. A TXV system will maintain a normal superheat value even when the system charge level has dropped significantly. For this reason, evaporator superheat cannot be used as a reliable method of confirming the refrigerant charge level on a TXV system.

Because of this "closed loop feedback" feature of TXV systems, they tend to mask underlying problems more than CCOT systems. This can make TXV systems harder to diagnose. The following section will provide an alternative method of determining TXV system charge level and some additional TXV system diagnostic tips.

Of course, if any doubt about charge level remains, the ultimate, and preferred solution is to evacuate and recharge the system with the correct amount of refrigerant.

However, there are occasions when you may want to satisfy yourself that a TXV system is reasonably close to the correct charge level without having to evacuate and recharge the system. For example:

- When the compressor has been replaced or other major repair work has been performed and you want to confirm that the system is correctly charged before returning the vehicle to the customer
- As part of preventative maintenance checkup of an AC system
- To eliminate an under or overcharge as a less likely cause of a system performance issue (at least temporarily) while you continue your diagnosis
- When system components have been changed that might affect the capacity of the system (e.g. evaporator/Condenser) and the correct system charge level is unknown

The following method of determining TXV system charge level should only be used after a maximum heat load temperature test has been performed. It should not be used as a standalone diagnosis. Look at all the information available to you when trying to arrive at a diagnosis.

Method of Determining TXV System Charge Level

This technique uses the relationship between high side pressure and liquid line temperature to help determine TXV system charge level.

Performing the test:
With the A/C system stabilized at idle record:

1. High side system pressure and
2. Liquid line temperature as close as possible to the condenser outlet.

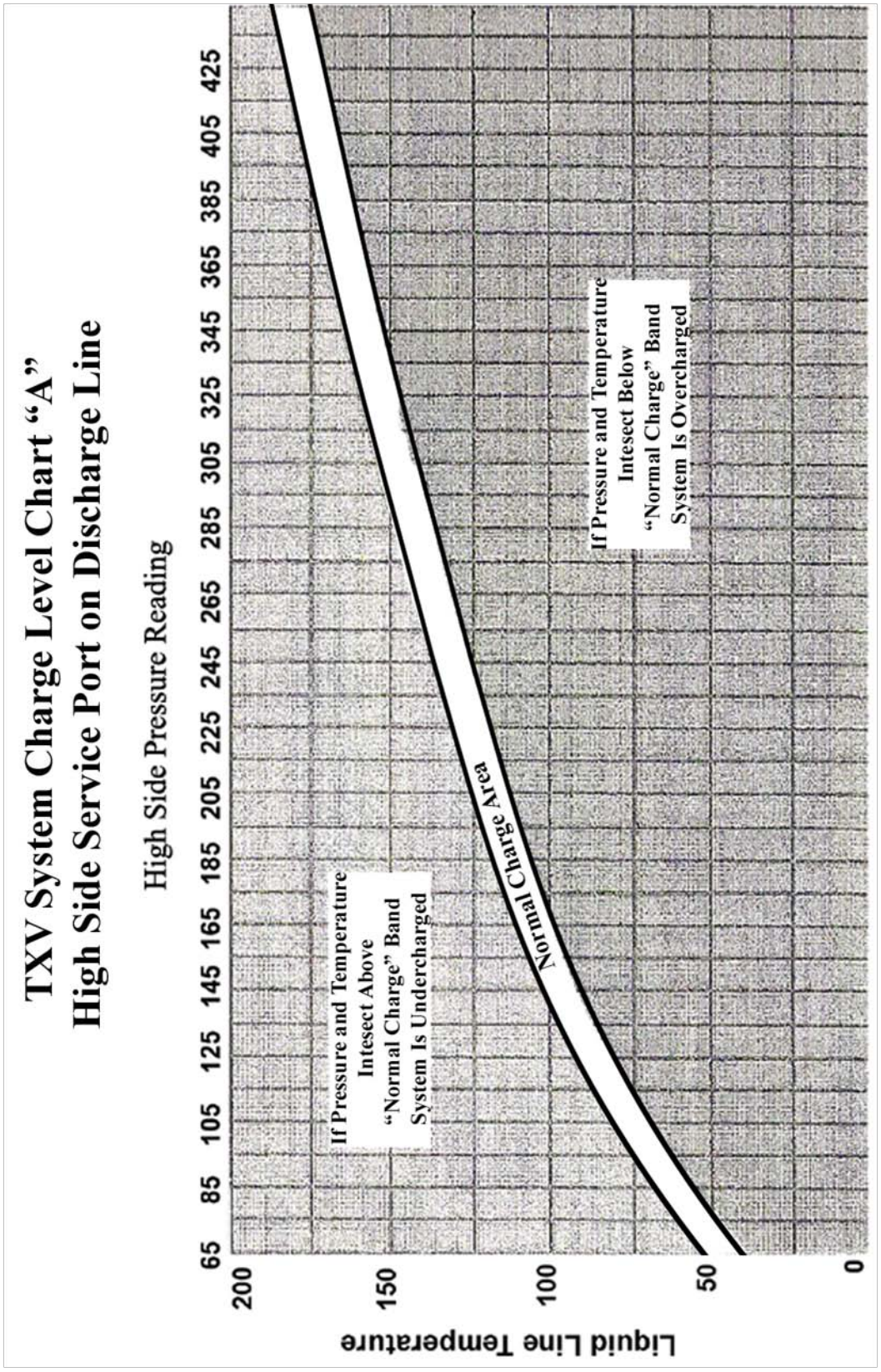
Now refer to the "TXV System Charge Level Chart "A" or "B" pages 3 or 4 (see note below) and find the point where high side pressure and liquid line temperature intersect on the chart. If they intersect in the "Normal" band, the system is close to correct system charge. If they intersect above the "Normal" band, the system is undercharged. If they intersect below the band, then the system is overcharged.
Note: Use chart "A" if the high side service port is located on the compressor or discharge port or line; use chart "B" if the high side service port is on the liquid line.

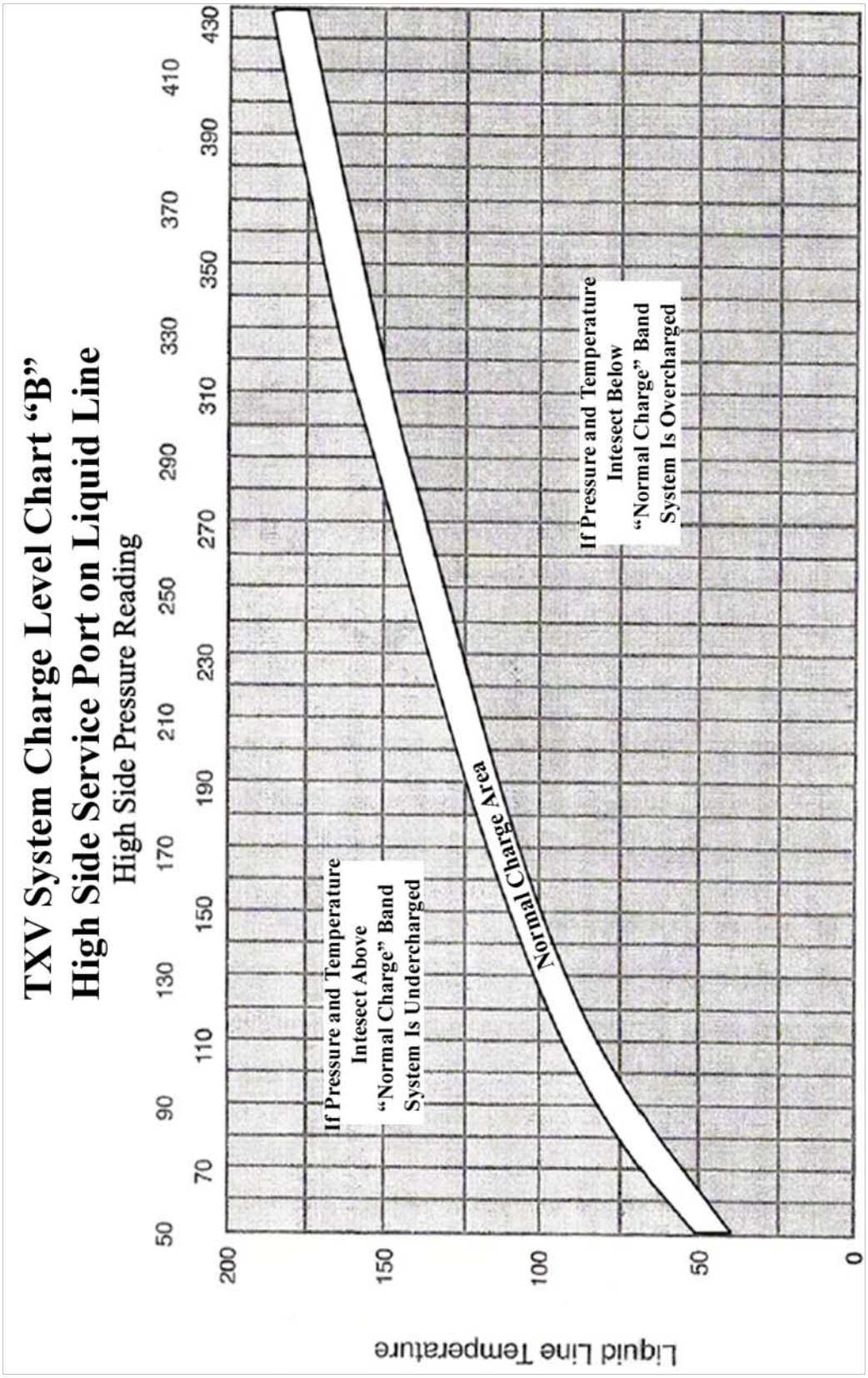
Quick Tip
You are checking a TXV system for a poor performance complaint and observe the following:

- There is no obvious condenser/radiator airflow problem
- The system has been properly charged with the correct amount of refrigerant
- High side pressure is normal
- **Low side pressure is low/normal but the evaporator outlet temperature is higher than normal**.

If low side pressure is low/normal but the evaporator outlet temperature is higher than normal then suspect that the TXV valve may be restricted. Possibly from debris or because it is stuck and not metering enough refrigerant into the evaporator. Refer to the R134a pressure temperature relationship chart on page 5. On a properly working system, the low side pressure/suction line temperature should be fairly close to the pressure temperature shown in the chart. For example, if the low side pressure was 30 PSI you would expect the suction line temperature to be around 35°F. However if the pressure was 25 PSI and the line temperature was 40°F, it would most likely indicate that there was excessive superheating taking place in the evaporator due to a lack of refrigerant.

TXV TROUBLESHOOTING CHART	
Symptom	**Possible Causes**
Suction Pressure High **&** **Superheat Reading Low**	**Defective Compressor** **Wrong TXV** **Poor Sensing Bulb Contact with Suction Line** **Refrigerant Overcharge**
Suction Pressure Low **&** **Superheat Reading High**	**Low Refrigerant Charge** **Wrong TXV** **Power Element Has Lost It's Charge** **Vapor In Liquid Line** **Plugged Filter/Drier**
Suction Pressure Low **&** **Superheat Reading Low**	**Poor Airflow At Evaporator / Evaporator Coils Iced** **Excessive Oil In Evaporator** **Other TXV In System Is Affecting The Other TXV**





R12/R134a Pressure Temperature Relationship Chart						
Temperature	**Pressure (PSIG)**			**Temperature**	**Pressure (PSIG)**	
°F	**R134a**	**R12**		**°F**	**R134a**	**R12**
-22	-2.5	-0.1		75.2	78.9	77.2
-18.4	-1.3	1.1		78.8	84.6	82.4
-14.8	0	2.5		82.4	90.6	87.7
-11.2	1.4	4		86	96.9	93.3
-7.6	2.9	5.5		89.6	103.5	99.1
-4	4.6	7.2		93.2	110.3	105.1
-0.4	6.3	8.9		96.8	117.4	111.4
3.2	8.1	10.8		100.4	124.9	117.8
6.8	10.1	12.8		104	132.6	124.6
10.4	12.2	14.9		107.6	140.7	131.6
14	14.4	17.1		111.2	149.1	138.8
17.6	16.7	19.4		114.8	157.9	146.3
21.2	19.2	21.9		118.4	167	154.1
24.8	21.9	24.4		122	176.4	162.1
28.4	24.7	27.2		125.6	186.2	170.4
32	27.7	30		129.2	196.4	179
35.6	30.9	33		132.8	206.9	187.9
39.2	34.25	36.2		136.4	217.9	197.1
42.8	37.7	39.5		140	229.2	206.5
46.4	41.4	43		143.6	241	216.3
50	45.4	46.7		149	259.5	231.6
53.6	49.5	50.5		158	292.4	258.7
57.2	53.8	54.5		167	328.3	288
60.8	58.4	58.6		176	367.3	319.4
64.4	63.4	63		185	409.6	353.3
68	68.1	67.5		194	455.5	389.6
71.6	73.4	72.3		203	504.4	428.5