



RUSSELL SIERRA AND HIGH SIERRA SYSTEMS

REFRIGERANT CHARGING GUIDELINES

READ THESE INSTRUCTIONS ALL THE WAY THROUGH BEFORE CHARGING THE SYSTEM

THERE ARE 5 KEY POINTS TO REMEMBER WITH THESE SYSTEMS

- ✓ **SIERRA AND HIGH SIERRA ARE BOTH FLOATING HEAD PRESSURE SYSTEMS**
 - ✓ **NO ADDITIONAL REFRIGERANT IS REQUIRED FOR WINTER OPERATION**
 - ✓ **NO LIQUID RECEIVER IS SUPPLIED – (NO STORAGE CAPACITY FOR “EXTRA” REFRIGERANT)**
 - ✓ **SYSTEMS UTILIZE OVERSIZED TXV’S THAT WILL REQUIRE FIELD ADJUSTMENT**
 - ✓ **DO NOT SIMPLY CHARGE TO A FULL SIGHT GLASS – THIS MAY BE TOO MUCH REFRIGERANT!**
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- Evacuate the system to a minimum of 500 microns. Blank off the pump and let stand for a minimum of 15 minutes to ensure there is no degradation of the micron level which would indicate the presence of internal moisture or a leak in the sealed system.

 - The initial system charge amount should be based upon a maximum of 3 pounds of refrigerant per nominal unit horsepower. For example; an 8 HP, R-404A unit would require (1) 24 Lb. drum of refrigerant.

 - Add as much of the initial refrigerant charge (as estimated above) directly into the liquid receiver. Small quantities may be introduced directly into the suction line. Additional larger quantities of liquid should be charged directly into the liquid line by attaching a high side gauge hose at the receiver outlet (king) valve, closing this valve completely (front-seat) and charging directly into the liquid line. It will be necessary to temporarily jump out the system low pressure control to operate the compressor in short bursts until charging is complete. **DO NOT LEAVE THE UNIT UNATTENDED AT THIS POINT IN THE CHARGING PROCESS!!!**

 - **Note: If the room temperature is elevated during the initial temperature pull down and no automatic means of suction pressure limiting is utilized on the unit (ex. CPR valve or pressure limiting TXV power element) then it may be necessary to temporarily throttle the compressor suction service valve to limit the maximum suction pressure at the compressor inlet to approx. 30 PSIG. This will prevent compressor overloading during the pull down process.**

 - Once the system is near the design operating room temperature the refrigerant charge should be checked by comparing the saturated discharge temperature (SDT) to the ambient air temperature entering the condenser. With a high side gauge, read the discharge pressure at the compressor service valve. Using the gauge dial or a pressure temperature chart, convert the pressure reading to the equivalent saturated temperature. Measure the air temperature entering the condenser and subtract this reading from the converted gauge pressure /

temperature. On medium temperature units the SCT should be approx. 25 degrees above the ambient air temperature. On low temperature units the SCT should be approx. 15 degrees above the ambient air temperature. Refer to the System Charging Example at the end of this bulletin.

NOTE: ALL CONDENSER FANS MUST OPERATE CONTINUOUSLY WHILE CHARGING!

- Once the system is near the design operating room temperature the evaporator superheat should be checked and the TXV(s) adjusted to maintain superheat leaving the evaporator in the following range;

LOW TEMPERATURE SYSTEMS; 6 TO 8 DEGREES

MEDIUM TEMPERATURE SYSTEMS; 10 TO 12 DEGREES

- With the box at design room temperature and the evaporator superheat adjusted as noted above, check the liquid line sight glass for flashing / bubbles. If necessary, add additional refrigerant via the suction line to just clear the sight glass. If there is only an occasional bubble then the system is adequately charged.

THERE IS NO NEED TO ADD ANY ADDITIONAL REFRIGERANT BEYOND THIS POINT!

- As a recap – proper system charging should include all of the following steps;

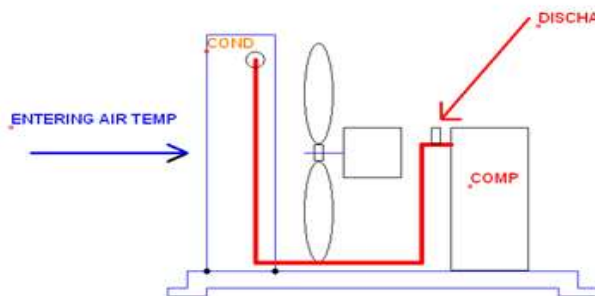
- **An initial system charge of 3 pounds per nominal unit HP**
- **Adjust TXV to maintain optimum evaporator superheat**
- **Compare SCT to condenser entering air temperature (EAT)**
- **Just clear sight glass as final charge adjustment**

SYSTEM CHARGING EXAMPLE

ENTERING AIR TEMP (EAT)
SATURATED CONDENSING TEMP (SCT)

EXAMPLE (LOW TEMP SYSTEM)

EAT = 45 DEGREES
ADD = +15 DEGREES
+ 60 DEGREES SCT (CONVERTS TO 126 PSI)



°F	°C	407C		408A		502†		404A		HP91		A
		Bubble	Dew	Bubble	Dew	Bubble	Dew	Bubble	Dew	Bubble	Dew	
-40	-40.0	2.7	4.6	3.5	3.1	3.7	4.9	4.2	5.6	3.7		
-35	-37.2	5.1	0.9	5.8	5.5	6.1	7.5	6.8	8.2	6.2		
-30	-34.4	7.7	1.6	8.5	8.0	8.7	10.3	9.6	11.1	8.9		
-25	-31.7	10.6	3.9	11.3	10.9	11.6	13.4	12.7	14.2	11.9		
-20	-28.9	13.7	6.5	14.5	14.0	14.7	16.8	16.0	17.6	15.1		
-15	-26.1	17.2	9.3	17.9	17.4	18.2	20.5	19.7	21.4	18.7		
-10	-23.3	20.9	12.3	21.7	21.1	21.9	24.6	23.6	25.4	22.6		
-5	-20.6	25.0	15.7	25.7	25.1	25.9	28.9	27.9	29.8	26.8		
0	-17.8	29.5	19.4	30.1	29.5	30.2	33.7	32.6	34.6	31.4		
5	-15.0	34.3	23.5	34.9	34.2	34.9	38.8	37.7	39.8	36.3		
10	-12.2	39.5	27.9	40.0	39.3	40.0	44.3	43.1	45.3	41.6		
15	-9.4	45.2	32.7	45.5	44.8	45.4	50.2	49.0	51.5	47.4		
20	-6.7	51.2	37.9	51.5	50.7	51.2	56.6	55.3	57.6	53.6		
25	-3.9	57.7	43.5	57.8	57.0	57.5	63.4	62.1	64.5	60.2		
30	-1.1	64.7	49.6	64.6	63.7	64.2	70.7	69.3	71.8	67.3		
35	1.7	72.2	56.1	71.9	71.0	71.3	78.6	77.1	79.6	74.9		
40	4.4	80.2	63.2	79.7	78.7	78.9	86.9	85.4	88.0	83.1		
45	7.2	88.8	70.7	88.0	87.0	87.0	96.8	94.2	96.9	91.7		
50	10.0	97.9	78.8	96.8	95.7	95.6	105.3	103.6	106.3	101.0		
55	12.8	107.6	87.5	106.2	105.1	104.8	115.3	113.6	116.3	110.8		
60	15.6	117.9	96.8	116.1	115.0	114.4	126.0	124.2	127.0	121.2		
65	18.3	128.9	106.7	126.7	125.5	124.7	137.3	135.5	138.2	132.2		
70	21.1	140.5	117.3	137.8	136.6	135.5	149.3	147.4	150.1	143.9		
75	23.9	152.8	128.5	149.6	148.3	147.0	162.0	160.1	162.7	156.3		