METROPOLITAN NY CHAPTER
Refrigeration Service Engineers Society

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Liquid "Push-Pull" Recovery Method

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There are several methods which can be used to recover refrigerant from a system. The most common is the vapor recovery method, where refrigerant in its vapor state is removed from a system, condensed into a liquid and then stored in a recovery cylinder. This method can be time-consuming, especially on systems with large amounts of refrigerant.

A faster method of recovering refrigerant is to remove the refrigerant in its liquid form. One method of recovering liquid refrigerant is the "push-pull" method. This method uses a recovery machine to pressurize the system and push liquid out and into the recovery tank. This method will speed up the recovery process. However, it is a two step process, as it cannot be used to completely recover all the refrigerant from a system. When liquid refrigerant is no longer traveling from the system, the recovery process must then be switched over to the vapor recovery method for completion.

This method is not practical for all systems. If any of the following conditions are present, the liquid "push-pull" method should not be used:

- the equipment contains less than 10 lbs of refrigerant;
- the equipment is a heat pump or other system with refrigerant flow that would prevent a technician from isolating the liquid;
- the equipment has an accumulator between the service ports used in the liquid recovery process;
- liquid refrigerant migration has occurred and the location of the liquid is unknown;
- the refrigerant tubing design on the equipment does not allow for a solid column of liquid refrigerant to be formed.

To use the "push-pull" method always follow the instructions provided by the recovery system manufacturer. Below is an overview of the process. Again, follow the directions provided by the recovery system manufacturer as different systems operate differently.

Before setting up the recovery equipment make sure the equipment (recovery machine, refrigerant hoses and recovery cylinder) can handle the pressures associated with the refrigerant being recovered. Check the condition of the recovery equipment to make sure there are no obvious defects. Also make sure to wear the appropriate personal safety equipment for proper eye and hand protection.

The manifold gage is connected similar to that of the vapor recovery method. The low side hose is connected to the low side of the system and the high side hose is connected to the high side of the system. A refrigerant hose is connected from the liquid side of the system directly to the liquid side of the recovery tank. Connected into this line is a filter/drier and liquid line sightglass. A refrigerant hose is connected from the vapor side of the recovery tank to the inlet of the recovery machine. The outlet of the recovery machine is connected to the transfer hose of the refrigerant manifold set. Make sure to place the recovery cylinder on a scale so its weight can be monitored during the recovery process. Do not fill any recovery cylinder to more than 80% of its total capacity.

Before beginning the recovery process make sure to open the necessary manifold and system valves and purge all the refrigerant hoses to prevent atmospheric air from contaminating the refrigerant being recovered. Once all the refrigerant hoses have been purged, open or close the appropriate manifold and system valves which will allow the liquid refrigerant to flow from the system directly into the liquid side of the recovery cylinder and the vapor from the recovery cylinder to flow into the recovery machine and then into the system to provide the necessary pressure to push the liquid refrigerant out of the system.

Start the recovery machine and monitor the weight of the recovery cylinder and condition of the refrigerant flow through the sightglass connected to the liquid side of the recovery cylinder. When the sightglass or the refrigerant scale show no signs of liquid refrigerant being transferred into the recovery cylinder, stop the process and switch to the vapor recovery method to complete the recovery of the refrigerant from the system.

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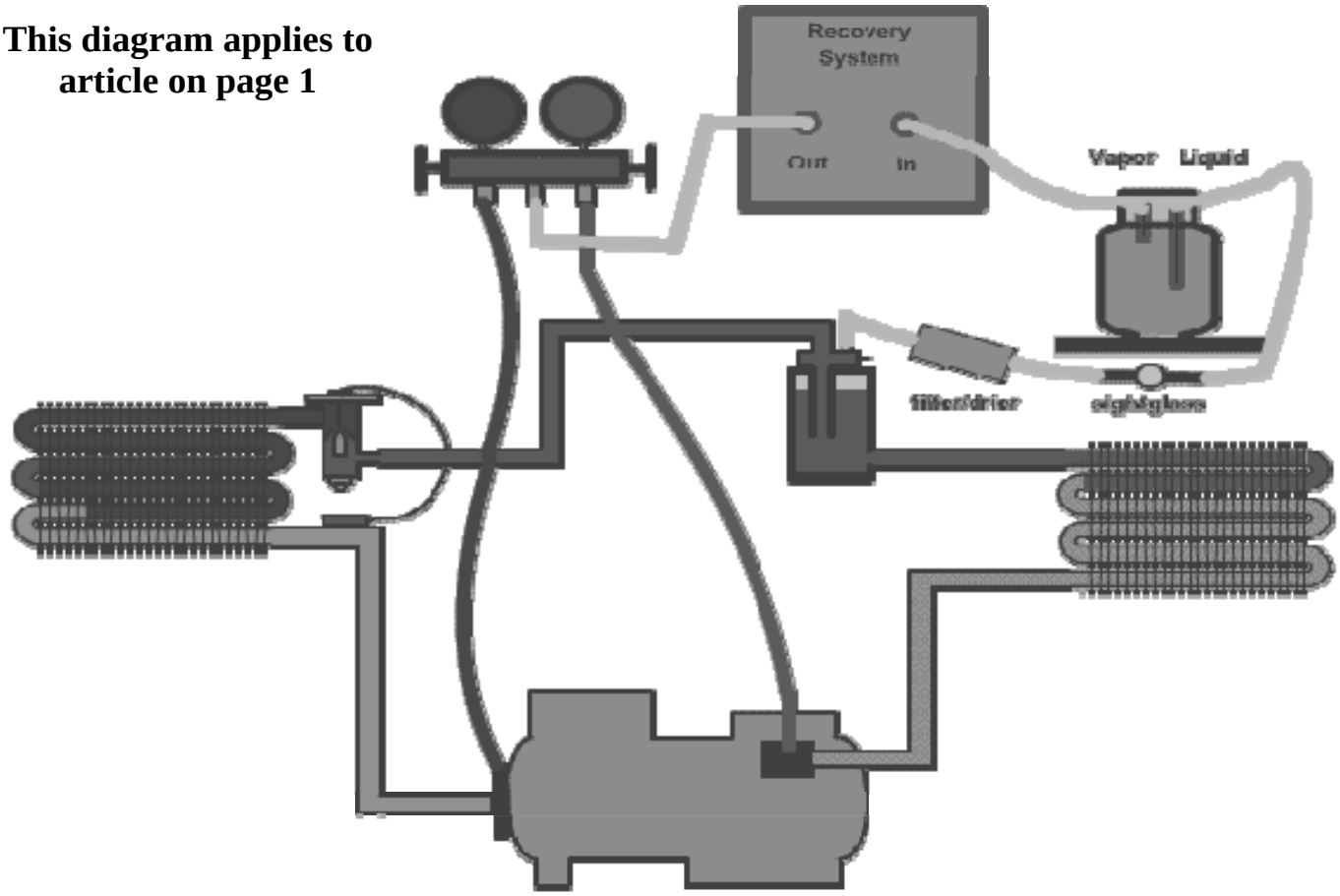
This diagram applies to article on page 1



Using Superheat to Check the Refrigerant Charge of an Air Conditioning System with a Fixed Orifice Metering Device

1. Operate unit a minimum of 15 minutes before checking charge.
2. Measure suction pressure by attaching a gauge to suction service port.
3. Measure suction line temperature by attaching a thermometer to unit suction line near suction valve. Insulate thermometer for accurate reading.
4. Measure outdoor coil inlet air dry-bulb temperature.
5. Measure indoor coil inlet air wet-bulb temperature with a sling psychrometer.
6. Refer to table. Find air temperature entering outdoor coil and wet-bulb temperature entering the indoor coil. At this intersection note the superheat.
7. If unit has a higher superheat than charted, add refrigerant until charted superheat is reached.
8. If unit has a lower superheat than charted, remove refrigerant until charted superheat is reached.
9. If air temperature entering outdoor coil or pressure at suction valve changes, charge to a new superheat as indicated on the chart.

Outdoor Temp.	INDOOR COIL ENTERING AIR TEMPERATURE WB											
	50	52	54	56	58	60	62	64	66	68	70	72
55	9	12	14	17	20	23	26	29	32	35	37	40
60	7	10	12	15	18	21	24	27	39	33	35	38
65	—	6	10	13	16	19	21	24	27	30	33	36
70	—-	—-	7	10	13	16	19	21	24	27	30	33
75	—-	—-	—-	6	9	12	15	18	21	24	28	31
80	—-	—-	—-	—-	5	8	12	15	18	21	25	28
85	—-	—	—-	—-	—-	—-	8	11	15	19	22	26
90	—-	—-	—-	—-	—-	—-	5	9	13	16	20	24
95	—-	—-	—-	—-	—-	—-	—-	6	10	14	18	22
100	—-	—-	—-	—-	—-	—-	—	—	8	12	15	20
105	—-	—-	—-	—-	—-	—-	—-	—-	5	9	13	17

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