Evacuation ……

1/4" Standard Charging Hose

- 1.8CFM max Evacuation @ 5’

3/8" Flexible Hoses

- Evacuates and charges 4 times faster than 1/4" hose

1/2" and 5/8" Flexible Hoses

- Evacuates and charges 8 times faster than 1/4" hose
- Allows you to pull a deeper vacuum
- More efficient job of removing moisture and contaminants from the system

How to Measure an "Adequate" Vacuum

ASHRAE recommends evacuation to below 1000 microns, and after isolation a system must not rise above 2500 microns within several hours. Some equipment manufacturers specify deeper vacuum such as 400 microns to ensure that harmful water vapor is removed from the system.

1000 microns equal only .039 inches of mercury, a measurement that cannot be made with a mechanical gauge, or determined by evacuation time or the sound of the pump. *The only tool that can measure vacuum at these levels is an electronic vacuum gauge.*

The best place to measure vacuum is at the system, not at the pump. With a combination vacuum/charging valve, you can attach the gauge directly at the system and isolate it from the pump, hoses and manifold for a true indication of the vacuum in the system. You can see the last evidence of moisture being removed and know that the system has dried out.

Q & A

I don’t have a micron gauge so I leave the pump on the system for two to four hours. Is this enough?

- First, you are guessing.
- Without a micron gauge we do not know if the oil in the pump is clean. The oil in a vacuum pump acts as a blotter and absorbs all of the moisture and sediment in the system. As the oil becomes saturated, the efficiency of the pump is drastically reduced.

If I put new oil in now and run the pump the same period of time, am I safe?

- Oil should be changed after every job and only while the oil is still hot.

- As the oil cools, the moisture separates from the oil and clings to the metal of the pump.
- Therefore, just changing the oil and not checking your vacuum with a micron gauge is still guessing as to whether the pump can actually pull the proper vacuum to eliminate the moisture in the system.

I pull only from one side of the system using a micron gauge, but at times my gauge will jump up to a higher number. Is this right?

- This can happen even if you pull on both sides of the system because there is a metering device to measure the pressure and refrigerant in the system.
    - Air or moisture can be trapped in one side of the system and will eventually let go and therefore a higher reading on the micron gauge will occur.
    - Sometimes moisture can be trapped in the oil of the compressor and when it escapes it will show up on the gauge.

I purchased a new micron gauge. How low of a vacuum should I pull?

- Some manufacturers have a micron range that they want their system pulled down to.
- Follow the Manufactures Recommended Evacuation Procedure.
- My suggestion is to pull a system down to 300 - 500 microns only if you are also pulling a vacuum on the compressor.
    - Going below 250 microns, you will start degassing the oil in the compressor and it will not be the same lubricating oil as it was originally.
    - The oil will only degas and will not suck up into the vacuum pump.

It seems to take forever to pull down the system I am working on. Does this mean I have a leak or a lot of moisture in the unit?

- Assuming that you are pulling on the high and low side of the system, did you remove the access valve cores?
- Leaving the cores in creates a big restriction and causes your vacuum to take a longer time to evacuate.
    - If you purge a system with Nitrogen to push out excessive moisture prior to evacuation; this will speed the complete process.

I bought a new micron gauge and I wanted to try it out with just my vacuum pump. I attached the gauge directly to the pump and it immediately went down. I then closed my blank off valve on my pump and the gauge went up very rapidly. Is the valve on my pump leaking?

- No.
- The gauge is too close to the pump and it does not have a chance to equalize in pressure.
- To do this experiment correctly, connect your pump and a micron gauge to a small tank with only copper tubing. Close the blank off valve as you did before and you will see a big difference in the reading.

Copper tubing??? Why not charging hoses?

- Either copper tubing or metal hoses used in JB`s DV-29 are the only ways you can hold vacuum.
- Vacuum is critical for leaks, more so than refrigerant.
    - Charging hoses, including environmental hoses still permeate.
    - Beyond permeation, where the hose ferrule is crimped to the hose represents a potential leak under vacuum.
    - Quick couplers with gaskets are not a good seal.
    - When you screw down the male flare to the gasket quick coupler, the gasket goes into several contortions and will not seal properly.

Then this means I cannot pull a vacuum on my system unless I use metal hose or copper tubing?

- No.
- You can pull a vacuum with charging hoses, but when you want to blank off the system to check for leaks, you will need to use copper tubing or metal hoses for the best assurance of a complete evacuation.

When I am pulling a vacuum on a system, I put my gauge connection to the pump, is this correct?

- Many technicians do this for ease of hook-up, but remember with this set-up you are actually reading what the pump is doing and not what the pump is doing to the system.
- To prove this theory, take a 50 foot coil of 1/4" OD copper tubing, braze a flare on one end and a tee on the other. Attach a micron gauge to the

male flare end and a gauge to the tee end and a line from the tee to the pump. Turn the pump on and you will notice the side closest to the pump will be a lot lower than the other.

- Eventually, this will equalize out and give the same reading. This will occur in a system on which you are pulling a vacuum.

Vacuum Pump Cold Weather Starting

Vacuum pump cold weather starting problems, regardless of pump manufacturer, can be traced to oil viscosity.

Upon completion of the evacuation process and while the system is being worked on, you may have a reading of 400 microns. It is conceivable the micron level within the pump head could be lower than 30 microns. As the entire vacuum head is immersed within the oil reservoir, when the pump motor is turned off, oil from the reservoir will be pulled into the head, displacing the vacuum. As the pump sits unused in cold temperature, the oil will thicken, eventually becoming the consistency of molasses. When power is next applied to the motor, which is designed to immediately turn at 1725 rpm, low viscosity oil within the stages is being forced to exit into the oil reservoir through very small discharge holes. The net result of this action will be severe strain on the electric motor, causing the motor to rapidly switch on and off until the low viscosity oil has eventually been expelled from the stages.

Solution to the problem

Upon completion of the evacuation, while the pump oil is still hot and any particulate matter and moisture is suspended in the oil, drain the reservoir. After draining, replace the drain plug and turn the motor switch on and off twice for a period of three to four seconds. Again open the drain valve, removing any oil residue from the reservoir. This will remove any remaining contaminated oil from the pump. With the drain valve replaced, refill the pump with new vacuum pump oil.

During extreme cold temperatures, place your pump inside the cab of your vehicle while driving to the job site. Heat from the vehicle heater will assist in thawing the pump and in turn increasing the viscosity level of the oil.

These simple procedures will ensure optimum performance from your pump while dramatically reducing excessive strain on the electric motor.