

Procedure Name: **Evacuation**
Procedure #: **INS-940**
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Evacuation

The process of evacuation is a pivotal step in the installation and maintenance of any air conditioning system. The purpose of evacuation is to remove all the air and moisture from the system in preparation for adding refrigerant and oil during the charging process. All air and moisture must be removed from any air conditioning system, as their presence will adversely affect performance and life of system components, particularly the compressor. Air and moisture is removed from the system through the use of a vacuum pump. A vacuum pulled on the system will result in reducing the boiling point of water to a level where it changes to a vapor at ambient temperatures and, along with the air, is drawn off and removed from the system by the vacuum pump. If the evacuation is properly completed per the steps below, the system is now ready for charging.

Should the evacuation process involve an AC system that is already charged, regulatory requirements mandate that technicians recovering R12 or R134a refrigerant be trained and certified in the process. Trans/Air recommends certification through MACS or ASE.

Pump - *Do not evacuate to a fixed time, always evacuate to the specified vacuum level of 1000 microns or less to assure removal of moisture from the system before charging.*

Micron gauge - Use of a Micron type gage (see equipment list) to assure that the proper level vacuum is attained is highly recommended. This will assure the removal of air and moisture. ***Air remaining in the system will degrade the system cooling performance, while the moisture remaining is both non-condensable and a basis for acid formation. Both may cause damage to system components like the compressor and expansion valve. .*** Proper use of the Micron gage will also serve as a first indication of a leak tight system.

Recommended Equipment

(See Figure 1 for typical hook-up)

1. **Manifold Gauge Set** - provides access and monitors pressures within the system. Normal connection configuration – Red = High side port; Blue = Low side port; Yellow = Vacuum pump ----- **T/A P/N 816189**
2. **134A Low Side Coupler** - connects air conditioning system low (suction) side access port to the manifold gauge low side hose ---- **T/A P/N 816052**
3. **134A High Side Coupler** - connects air conditioning system high (discharge) side access port to the manifold gauge high side hose ---- **T/A P/N 816053**
4. **Vacuum Pump** – removes moisture and air from the system in order to obtain the required vacuum level measured by the micron gauge ---- **T/A P/N 816188**

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5. **Digital Micron Gauge** - monitors the vacuum level during the evacuation process in units of microns ---- **T/A P/N 816117** (For installation efficiency T/A recommends two micron gages but one can be switched from one side to the other)
6. **Ball Valve Adapter** - used in oil and refrigerant charging. It connects the 4-way Manifold Gauge Set to the 3/8" high side charging hose ---- **T/A P/N 816203**

To perform a quality evacuation, follow the step by step instructions of a typical evacuation set-up below (equipment list numbers are noted for each step):

Note: Set-up will vary based on equipment available.

1. Connect the blue side hose from the manifold to the low (suction) side access port using the low side coupler
2. Connect the red side hose from the manifold to the high (discharge) side access port using the high side coupler
3. Connect the two yellow vacuum hoses from the manifold to the vacuum pump. Make sure that both valves are closed. (horizontal position)
4. Connect micron gauge service port on the pump.

Caution: Never allow a positive pressure to enter the micron gauge or vacuum pump

5. Open Suction and discharge couplers.
6. Open suction (blue) and discharge (red) valves on the manifold
7. Open both vacuum valves (yellow) on the manifold

Caution: before starting vacuum pump, familiarize yourself with the manufacturer start-up instructions for the pump and the micron gauge.

8. Start vacuum pump
9. Turn on micron gauge and monitor progress.

*Reduction in system pressure should be gradual. If the micron level immediately drops, check the couplers (2 & 3) to be sure the schrader valves are depressed at the suction and discharge accesses. **The target final vacuum reading on the micron gauge is at or below 1000 microns.** It may be necessary to reduce the level to below 500 microns to have the system stabilize below 1000 microns when the pump is isolated, and to give time for the moisture to boil off. The time to achieve this level will vary with the size of the air conditioning system with the larger systems taking longer.*

10. When the desired level is reached, isolate the vacuum pump from the system.
11. With the vacuum pump locked out, note the vacuum level on the micron gauge.

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A system that is leak free and dry will remain below 1000 microns for 5 minutes. If it does hold continue to step 12.

A system that rises above 1000 microns but levels off and stabilizes when the pump is isolated is probably still contaminated with moisture. Reconnect the pump to the system and continue the evacuation process.

A system that rises above 1000 microns and continues to rise without stabilizing has a system leak that must be repaired before continuing (see INS-950 Leak Detection). Repeat steps 1-10 after the leak is corrected

12. Close all valves.

Preparation for charging

13. Disconnect one vacuum hose from the vacuum pump

14. Install ball valve adapter on the disconnected hose end

15. Hook other end of ball valve adapter and hose to the refrigerant tank

16. Open ball valve adapter and the vacuum valves (yellow) on the manifold

17. Evacuate hose until micron gauge reaches 1000 microns or less

18. Close both vacuum valves (yellow) on the manifold gauge

19. Disconnect micron gauge

20. Turn off micron gauge

21. Shut off the vacuum pump, disconnect the vacuum hose from the vacuum pump

22. With the system holding below 1000 microns as previously established, the system is now ready for charging.

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Evacuation Hook-Up

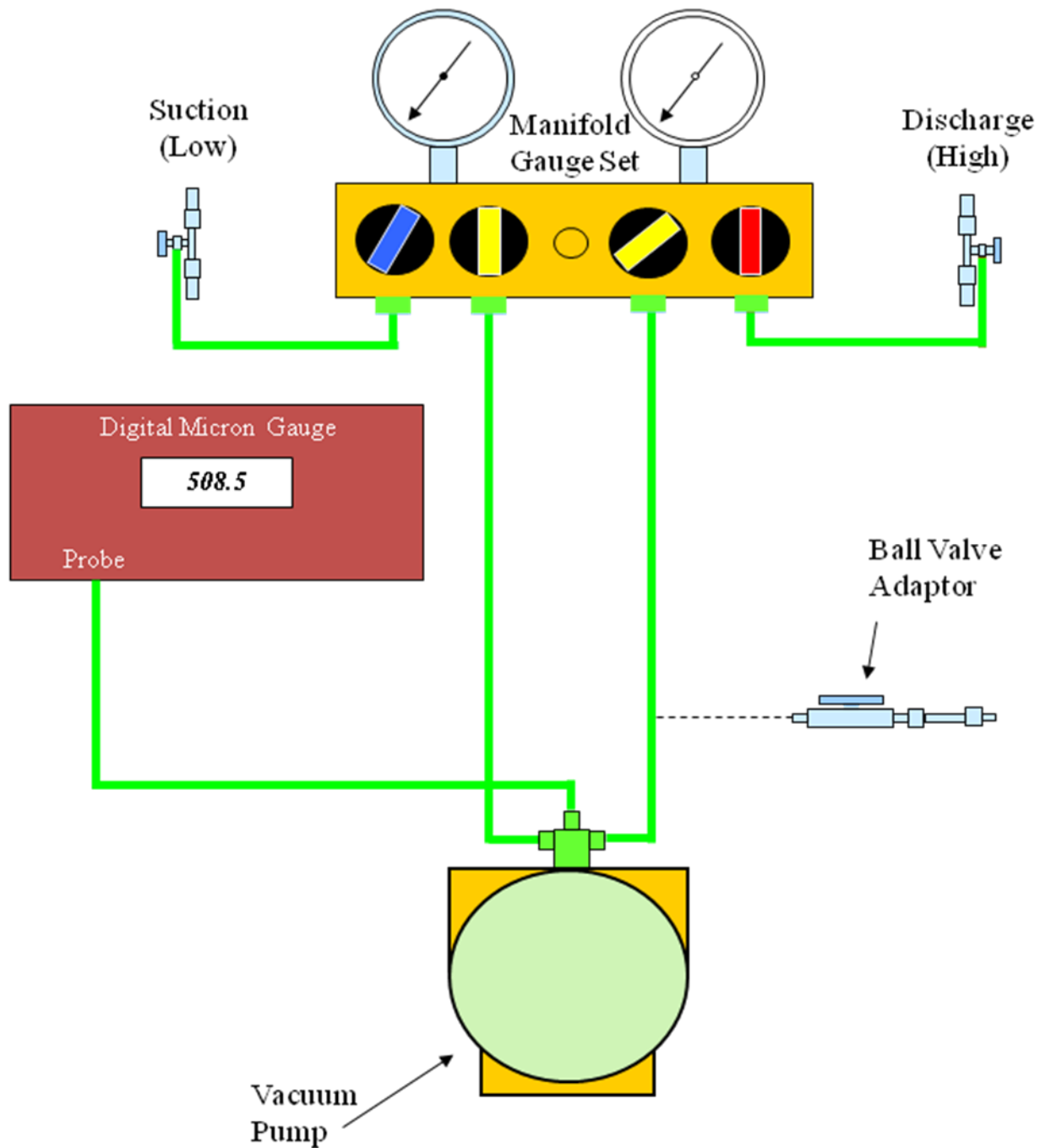


Figure 1

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