

How to completely evacuate and recharge your A/C system.□

A thorough evacuation is necessary after servicing or replacing system components or when converting to Freeze 12, R134a, or any other refrigerant. It simply shows the steps required to draw a vacuum on the system to remove moisture and other contaminants and charge the system with oil and the refrigerant of your choice. The necessity of properly capturing any refrigerant already in the system must be noted. You really should do yourself, the rest of us, and the environment a favor and have that stuff removed and recycled by someone with a lot more experience and the proper equipment. Of course, if you have already had this done, you can skip over all the vacuum pump stuff and move on to the “just make it cold again” stuff.

The faq is also not intended to be complete “how to” for conversions although the evacuation and charge procedures will be the final steps in any conversion. Only the connectors will be different.

The processes described here involve toxic chemicals under high pressures. Please read the instructions that come with any equipment you purchase, rent, or borrow. By all means, please be careful and enjoy a frosty beverage AFTER you have completed the work.

Two final things: Do not take this article as an advertisement for Freeze 12. It is simply what I was using on the day the pictures were taken. I used it as I have had success with it in the past and I didn't want to replace anything more than the refrigerant and oil. R134a is probably a better long-term solution and there are other refrigerants available as well. Do your research and choose the one that best fits your needs. I also am far from an expert on these things. Please feel free to submit corrections and/or additions to this document. I would like to see this grow to include the full conversion procedures and upgrades.

Stuff You Will Need

Manifold Gauges – A serviceable set can be purchased for less than \$50. Less if you purchase them used. Not too bad when compared the what you would pay someone else to just top your system up and you can use them to diagnose problems with your A/C (refrigerator, etc.) later.

Vacuum Pump - These things are fairly expensive. Stand alone units start in the \$250 range. There are air driven ones available for about \$50, but you need a compressor capable of delivering 80-100 psi continuously for over half an hour. This burns up tons of electricity and is very noisy. I was able to borrow the one pictured below. You may be able to rent one.

Small Thermometer – You may already have one of these in your kitchen. Handy to have and they only cost a couple of bucks. You will use this to measure the performance of the system when you complete the charging.

Refrigeration Oil, Refrigerant, and the connections required for dispensing them. Freeze 12 is

pictured, but the basic setup will be similar for R12 (good luck finding it!), R134a, and any other refrigerants. Each refrigerant is required to have a unique fitting to prevent mixing different types. The thing with the blue cap is a fitting to convert the standard R12 fitting to the Freeze 12 fitting. Also make sure the type of oil you purchase is compatible with the refrigerant you are using. Again, do your research!

Haynes Automotive Heating & Air Conditioning Techbook – This is a great book. It goes into much greater detail than I do here. It also provides troubleshooting procedures.

Evacuating the System

I will assume you have replaced the part that got you to this point already and have checked all of the system plumbing for tightness. The first thing to do is get the gauges connected. Nothing tricky here. You just have to identify the high pressure side and low pressure (suction) side of the system. On the E12, the high pressure valve is on the receiver/dryer bottle and the low pressure valve on a line just below and forward of the receiver/dryer. The blue hose from your manifold gauges goes on the low side. The red one goes on the high side. There is a yellow line coming from the gauges as well. It is the service line. It is the one you use to pull things out of or put things into the system. The photo also shows a nice vacuum gauge I borrowed from the same guy I got the pump from. It wasn't needed. The manifold gauges will tell you all you need to know.

I started this process by purging my system with compressed nitrogen. This may not be practical unless you know someone with a cylinder. If you do, it is a good idea. It is inert and works as a good pressure test to check for leaks. When cranked to 200 psi, you'll know if you have any leaks. If you don't have access to compressed nitrogen, don't sweat it. Deep vacuuming of the system will get all that nasty moisture out of the system anyway.

Connect the yellow line to the vacuum pump and ensure both the high and low side valves on the manifold gauges are closed. Read the instructions for the vacuum pump before turning it on and make sure it has oil in it (doesn't apply to the air driven venturi type). The pump I used had very specific instructions for starting. It required opening a valve on top of the pump, starting the pump, then closing the valve.

After starting the pump, open both the high and low side valves on the manifold gauges. Verify the low side gauge indicates a vacuum (picture at left). The low side gauge indicates both pressure (psi) and vacuum (in/hg). If it does not go below zero, you have a sizeable leak and will need to correct it before you continue. Assuming you are showing a vacuum, let the pump run for five minutes, close the high side valve, and turn the pump off. Note the reading on the low side gauge. Wait five or more minutes and then check the reading again. Any decrease in indicated vacuum indicates a leak that still needs to be corrected. If this happens, check the connections to the gauges and pump first. Once you are satisfied there are no leaks, turn the pump back on, open the high side valve again and let the pump run for at least thirty minutes.

After the time has passed, close both the high and low side valves and turn off the vacuum pump following the shutdown procedure for the pump. You can then disconnect the yellow line from the pump satisfied that you have removed all of the air and moisture from the system.

Adding Oil

Your compressor needs oil to function. The oil used is carried through the system by the refrigerant and chances are you lost some while you were servicing things. If you are doing the R134a conversion, you should remove the compressor and drain all of the existing mineral oil, as it is not compatible with R134a. You should also replace the receiver/dryer. Measure the amount of oil contained in each by pouring it into a suitable container. I was replacing a damaged receiver/dryer so I just measured what was in it and purchased enough to replace it. If you have the compressor or receiver dryer off, you can simply pour the oil into them before installation. Small cans of the proper oil can be installed using the newly created vacuum to pull the oil into the system.

The car should not be running at this point. Using the can tapping valve, connect the service line, opened the valve on the can and cracked the service line connection at the manifold until oil started to leak out to purge any air out of the service line. Holding the oil can upside down (valve down), open the low side valve on the manifold gauge. The vacuum will pull the oil into the system. When you have determined the can is empty, close the low side valve and the valve on the can. You should now be ready to charge the system.

Charging With Refrigerant

Start the car. Turn the A/C temperature control to its highest setting, and the fan to low. Allow the car to idle like this for about five minutes to settle the pressures and temperatures in the system. During this time, connect a can of refrigerant to the can tapping valve and connect it to the service line on the manifold gauges. After the system has stabilized, turn the A/C fan to high. Open the valve on the refrigerant can and purge the line like you did with the oil. Now open the low side valve on the manifold gauges. I usually put the refrigerant in as a liquid. Invert the refrigerant can to do this (valve down). When doing this NEVER OPEN THE HIGH SIDE VALVE. The system is not capable of compressing the liquid. When the can is empty, shut off the low side valve, shut off the can valve, and remove the can from the valve. Repeat with the next can as necessary. It will probably take two or three cans (depending on the refrigerant you use) to fill the system. You can consult the Haynes manual to learn how to use the gauges to determine when the system is full or just use the sight glass on the receiver/dryer.

The sight glass is very easy to use: keep adding refrigerant until you stop seeing bubbles in the sight glass. (Note: if charging with R134a and stock condenser, you may not be able to get a full sight glass before you've reached the high limit of condensing pressure. A good rule of thumb with R134a is to run fan on High with all windows open and engine at 1500 rpm. High side pressure in PSI should be about 2.2 to 2.5 times outside air temperature in degrees F. Example if it's 90 degrees F, high side should be no higher than 225PSI. - Peter Florance)