

How to Check the Refrigerant Charge in R134a Fridge or Freezer Systems

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General

The following information is intended to check the charge without touching the system. It will describe what symptoms to look for in a correctly charged capillary system. Working with refrigerants involves potentially dangerous pressures and temperatures and precautions must be taken to avoid injury or release of environmentally harmful gases into the atmosphere.

PLEASE NOTE:

Only a qualified refrigeration engineer should adjust the charge on your refrigeration system. This manual is diagnosis information only.

A Correctly Charged System

Most evaporator systems use capillary tube systems to manage the flow of refrigerant into the refrigerator. They require a very precise refrigerant charge to work at maximum efficiency. Too much or too little refrigerant will result in a system that will have some cooling effect, but will not be working to its full potential. In a capillary system, the temperature of the evaporator is directly related to the amount of refrigerant in the system. There should be enough refrigerant in the system so that the last of the liquid is evaporating back to a vapor at the very end of the evaporator, just before it enters the suction tube back to the compressor.

After running for a short time, (10 to 20 minutes depending on the size of the evaporator) there should be a slight coating of frost all over the surface of the evaporator with no condensation or frost on the exposed section of copper tube back to the compressor, or condensation on the compressor itself. If the system has been installed correctly, the short length of insulation supplied with the system should be positioned on the copper tube starting where it exits the refrigerated box. No other insulation is required, and any extra that has been installed will only cause the system to run at less than maximum efficiency and may conceal symptoms of an overcharge. This short length of insulation is installed to prevent any condensation that may occur as the cold refrigerant leaves the refrigerated box on the return pipes and is exposed to hot, humid air. In a properly charged system, there should be a slight "gurgling" sound from the evaporator as the refrigerant evaporates and flows around the system.

How to Identify if Your System is Slightly Undercharged

If there is too little refrigerant in the system, all the refrigerant will have evaporated back to vapour long before it reaches the end of the evaporator in your refrigerator. The result is that only some of the surface of the evaporator will have a coating of frost. The frost will stop at the point on the evaporator coil that all the refrigerant has turned to vapour, and the surface will be cold and sweating water. By following the channels in the evaporator, you can determine the path the refrigerant follows and the end of the capillary tube can be easily

identified. This is where the liquid refrigerant is fed into the evaporator and where the frosting begins. The evaporator will probably sound the same as a properly charged system.

How to Identify if Your System is Seriously Undercharged

If the system is seriously undercharged, the refrigerant may only exist in the refrigeration system as a vapour. In this case there will be no frosting on the evaporator, just a slight sweating and cold to the touch. In this condition there will probably be a constant hissing sound from the evaporator. This is important in identifying if the system is undercharged or overcharged.

How to Identify if Your System is Slightly Overcharged

Too much refrigerant in the system will result in liquid still evaporating back to a gas past the end of the evaporator and inside the return piping going back to the compressor. This means that there is still some of the refrigeration process going on inside the tubing and there will be a build-up of frost or ice on the exposed section. If additional insulation has been added, it may be concealing this symptom and should be removed. The evaporator may appear and sound normal, but will be at a higher temperature than desired, resulting in longer than expected run times.

How to Identify if Your System is Seriously Overcharged

If so much refrigerant exits in the system that it raises the temperature of the evaporator above 0°C (32°F) the surface of the evaporator will only be sweating and cold to the touch, resembling an undercharged condition detailed above. However, the return piping leading back to the compressor, and maybe even the compressor itself, will be also be cold and sweating. You will probably hear a sound similar to a mountain stream coming from the evaporator. ***This is a potentially damaging condition*** as liquid may reach the compressor where it can damage the valves. Refrigeration compressors are designed to compress gas only. If you suspect that your system is seriously over charged turn it off immediately and contact us.

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