

Frigoboat R134a charge guidelines

General

The following is intended to be a guide for a boat operator with average mechanical skills. It will describe what symptoms to look for in a correctly charged Frigoboat system so that an evaluation can be made as to whether service is required. No refrigerant gages are necessary for this evaluation, and their use is required only for major repairs and for evacuating the system.

Warning!

Never use, or allow a technician to use, anything other than pure refrigerant R134a in a Frigoboat system. Cans of refrigerant R134a with additives must never be used, nor must stand-alone additives be introduced into the system. These additives include but are not limited to: leak detecting fluid, leak stopper, dye, extra oil, conditioner, etc. Serious damage can result from the use of such products, which are designed for use only in auto air conditioning systems.

Symptoms of correct and incorrect charge

Correctly charged system

The Frigoboat systems are capillary tube systems, and require a precise refrigerant charge to work at maximum efficiency. Too much or too little refrigerant will result in a systems that will have some cooling effect, but will not be working to it's full potential. In a Frigoboat 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, and just as it enters the suction tube back to the compressor. After running for a time, there should be a slight coating of frost all over the surface of the evaporator, and there should be no condensation or frost on the exposed section of copper tube back to the compressor, and no 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 tube leaves the refrigerated box and is exposed to hot, humid air. In a properly charged system, there should be a "tinny, gurgling" sound from the evaporator.

Slightly undercharged system

If there is too little refrigerant in the system, it will have evaporated back to a vapor before it reaches the end of the evaporator. Some of the surface will have a coating of frost, but from the point where the refrigerant has turned all to vapor, the surface will be cold and sweating. The frost begins at end of the capillary tube, where the liquid refrigerant is fed into the evaporator. The evaporator will probably sound the same as a properly charged system.

Seriously undercharged system

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

Slightly overcharged system

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 tubing 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.

Seriously overcharged system

If so much refrigerant exists in the system that it raises the temperature of the evaporator above 32 deg F, the surface will only be sweating and cold to the touch, resembling an undercharged condition. But the copper lines leading back to the compressor, and maybe even the compressor itself, will also be cold and sweating, and there will probably be a sound similar to a mountain stream coming from the evaporator. This is a potentially damaging condition as liquid can reach the compressor where it can damage the valves, since refrigeration compressors are designed to compress gas only.