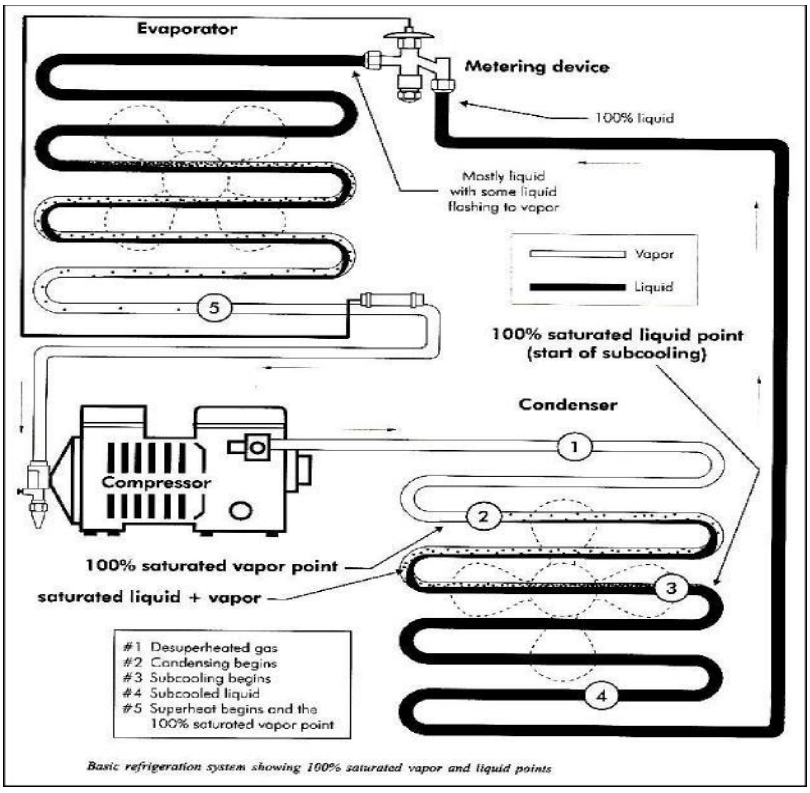
EnerFreeze® and How It makes Your Air Conditioning or Refrigeration System More Efficient

Since the invention of air conditioning and refrigeration there has been a continued effort to improve the efficiency of the systems. Equipment manufacturers continue to introduce systems that are more efficient than their predecessors. The real question: is there a way to improve the efficiency of older equipment? The answer is, of course, "yes." You can start with proper maintenance and then go to parts or refrigerant replacement where possible. These range in cost from not very much for good preventive maintenance to very expensive for component changes. So the real question becomes: is there a way beyond preventive maintenance to improve efficiency and prolong unit life? The answer to that is "yes." Most of these products focus on the removal of oil fouling to improve heat transfer. Most of the products on the market are able to remove oil fouling, at least on a temporary basis, to improve heat transfer. Removal of oil fouling, particularly on a unit over ten years of age, will produce significant results in heat transfer capability and get the unit close the its original EER. Depending on the method used to remove the oil fouling, it can return to its original level of performance within a year. In order to create a successful solution there needs to be some common elements that can help assure a lasting ROI such as:

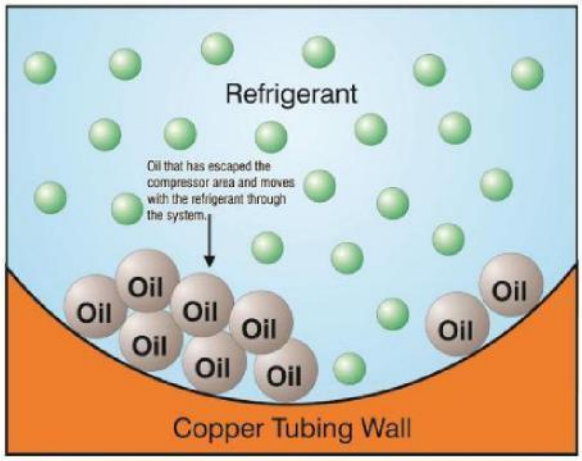
- one time injection lasting the life of the unit,
- compatible with all present lubricating oil and refrigerant combinations,
- compatible with all system components,
- contain no ingredients that can form acids or other harmful chemicals,
- environmentally friendly, and
- substantially reduces energy cost on a sustainable basis.

EnerFreeze® is a patent pending technology that was designed to meet all of these requirements and more. The best way to look at EnerFreeze® and what it does within a system is to look at each component of the system. The following representation of a system will be used to illustrate how EnerFreeze® works within the system.

EnerFreeze Canada Inc. 5000 Yonge Street, Suite 1901, Toronto, Ontario M2N 7E9
Telephone: (416) 800 0495

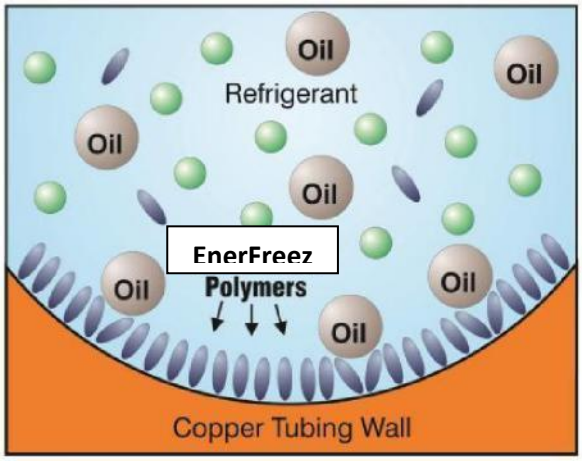


Once EnerFreeze® is injected into the system it will remove the oil fouling and becomes a part of the surface and subsurface of the tube wall at the beginning of the process.



Before Treatment:

Some lubricating oil escapes from the compressor and mixes with the refrigerant. This oil travels throughout the entire air conditioning system where it attaches itself to the metal surfaces on the inside of the heat exchanger coils. This has the effect of insulating them and the end result is the reduced ability to transfer heat and more total energy is needed to circulate the refrigerant throughout the system (because of increased friction), resulting in reduced efficiency and greater run times



After Treatment:

EnerFreeze will dislodge this layer of non-conductive oil and will continue to work to prevent future build up. This will allow for much better refrigerant flow due to reduced friction, greater heat transfer, greater overall performance and reduced run times

EnerFreeze Canada Inc. 5000 Yonge Street, Suite 1901, Toronto, Ontario M2N 7E9
Telephone: (416) 800 0495

We will begin at the heart of the system which is the compressor. All types of compressors have friction in the bearing surfaces, particularly at compressor start-up. Chemically inert PTFE (listed as the slickest substance known, equal to “wet ice on wet ice”) forms a boundary layer on the bearing surfaces that virtually eliminates friction and greatly reduces the amperage (LRA) necessary to go from stop to run.

This is a very short duration amp spike but its significance has more to do with compressor wear than its significance to amp reduction. When the compressor is running you will notice the following:

- Compressor noise is reduced by 3 - 5 decibels, indicating less noise produced by friction.
- Compressor head temperature is reduced by 5 - 10 degrees Fahrenheit, also indicating less friction.
- Compressor high pressure gas temperature is reduced by 5 - 10 degrees Fahrenheit.

So everything we observe in the compressor is an indicator of improved efficiency and longer life.

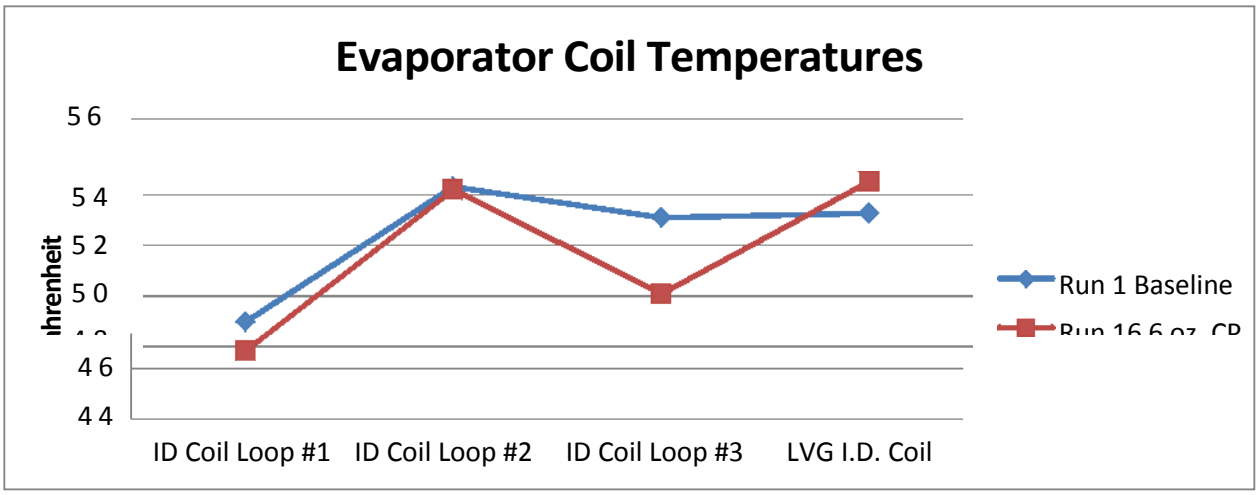
When the hot gas leaves the compressor it will go to the condenser. The purpose of the condenser is to remove heat from the gas taking it from a gas state to a liquid state. That heat is removed either by airflow through the condenser fins or by a heat exchanger utilizing water or another liquid to effect the heat removal. Because of the high temperature of the entering gas the condenser is more subject to oil fouling and reduced condenser efficiency. The EnerFreeze® PTFE boundary layer facilitates the transfer of heat out of the refrigerant and also improves the refrigerant flow through the system by 4 - 6%. This occurs because the tube surface has reduced friction because of the PTFE, allowing for less resistance to flow and improved flow velocity. That improved velocity will create the opportunity for more heat transfer throughout the system.

The next component is the thermal expansion valve (TXV) that regulates the flow of liquid refrigerant into the evaporator. This is an area that can create problems when the valve function is impeded by oil fouling or impurities. EnerFreeze® removes the impurities and provides a boundary layer that prevents them from recurring while improving the physical functioning of the valve. This will allow the TXV and the evaporator to function more efficiently.

As we come to the evaporator, the liquid refrigerant begins its phase change from liquid to gas and during the process removes heat from the air passing thru the evaporator. This is where the majority of heat transfer occurs. Aside from the removal of oil fouling and the increased refrigerant velocity, EnerFreeze® provides additional heat transfer capabilities in the evaporator.

The following is from a new 3 ton split air system run in a test cell. There is no oil fouling involved so what you are seeing is a true change in heat transfer capability.

As part of the design of EnerFreeze® there are proprietary polymers that will not become a part of the boundary PTFE layer.



These polymers circulate with the refrigerant and when they get to the evaporator they provide inert particles that aid in nucleation during the pool boiling phase. Simply put it is like water boiling at a lower temperature when you introduce a substance like salt. This change in pool boiling will lower the evaporator temperature and allow for more efficient operation.

The cooler evaporator will remove more humidity and allow the system to reach the set temperature sooner and cut off the compressor. Less compressor run time reduces the Kwh required to cool the space to the desired level, thereby reducing utility costs and extending compressor life.

EnerFreeze Canada Inc. 5000 Yonge Street, Suite 1901, Toronto, Ontario M2N 7E9
Telephone: (416) 800 0495