MaxR-l00™

Thermodynamic Altering Enhancement Fusion

This thermodynamic changing enhancement is a rejuvenating amalgam and increases refrigerant-side heat transfer efficiency. Scientifically, MaxR100™ is referred to as fouling inhibitor and "mini-fins" effectiveness for thermal circuits. MaxR100™ inhibitor is critical to the normal efficiency function of every heat exchanger and metering devise used in the refrigeration system.

However, it also contributes to increased HEAT TRANSFER and the reduction in system fouling. The higher viscosity of oil reduces molecular and turbulent transport of liquid refrigerant in the condenser. All of these factors directly translate into excessive load on the condenser Heat Rejection Factor [HRF]. This will cause higher head pressure, higher discharge gas temperature and higher condensing temperature with higher power draw by the refrigeration compressor. This in turn accelerates build-up of viscosity or breakdown of viscosity.

Worse than that, the oil will react easier with the refrigerant, metals and contaminants such as dirt, oxide scale, flux, rust, steel, cooper and brass chips frequently found in the refrigeration system to form sludge, gums, varnish and carbon deposit on the condenser tube surface area, thermostatic expansion valve or electronic expansion valve, evaporator surface area and compressor.

Oil contamination in the refrigerant will also reduce the volumetric capacity of the condenser. If 10 percent of the liquid refrigerant and oil solution is oil, then only 90 percent of the solution can be refrigerant and so the unit must operate much longer in order to have the required amount of refrigerant passing through the condenser there is an excessive loss of energy to overcome the frictional loss due to viscous drag in the evaporator tube surface area that further accelerates the increase of refrigerant-oil mixture viscosity and oil non equilibrium behavior.

The oil excess layer forms during the phase change from liquid to vapor. The oil excess layer has a very large viscosity that causes a large oil volume build-up in the evaporator tube surface area and as a result will take up valuable evaporator surface area used for vaporization. The oil excess layer causes insulation effect to decrease boiling of refrigerant, to increase pressure drop, and to reduce molecular and turbulent transport of refrigerant, therefore dramatically reduces the evaporator heat transfer efficiency.

All of these factors will produce a larger temperature difference between load and evaporating refrigerant. Increase of temperature difference in evaporator indicates a decrease in COP and refrigeration capacity. Refrigeration capacity and COP are further reduced to the extent that vapor pressure of refrigerant-oil solution is less than that of vapor pressure of the refrigerant alone. If operation of compressor is controlled by suction pressure, it will stop running at a higher temperature when vapor pressure is reduced. Therefore for an evaporator to operate with maximum heat transfer efficiency, it must be fed with oil free liquid refrigerant. To accomplish this, TXV or EEV must feed evaporator with oil free liquid refrigerant at the same rate that it evaporates. Studies have shown that oil presence can reduce system performance as much as 30%.

A heat exchanger fouling condition exists when refrigerant and oil containing plaques form within heat exchangers. These plaques block the heat exchangers and reduce the transfer of heat process through the walls of heat exchangers. When plaques build, more particles form on the plaque, thereby further blocking the metering devises and reducing the net refrigerant effect.

MaxR-l00™ is able to scrub the fouling deposits, slow the formation of new plaques and can reduce the size of plaques that already exist. In addition, through mechanisms, MaxR100™ also stabilizes enhanced heat transfer process and cleans the refrigerant systems.

With what has been briefly reviewed above, it is clear that there is a need to resolve the problems related to oil vapor and oil aerosol carry over, thermal and chemical stability, moisture, oil cleanliness and lubrication to avoid unnecessary waste on energy consumption and maintenance cost. There have been quite a few suggestions in the past to minimize the problems mentioned above. Those suggestions are focused on partial solution to the problems and are often with serious drawback.

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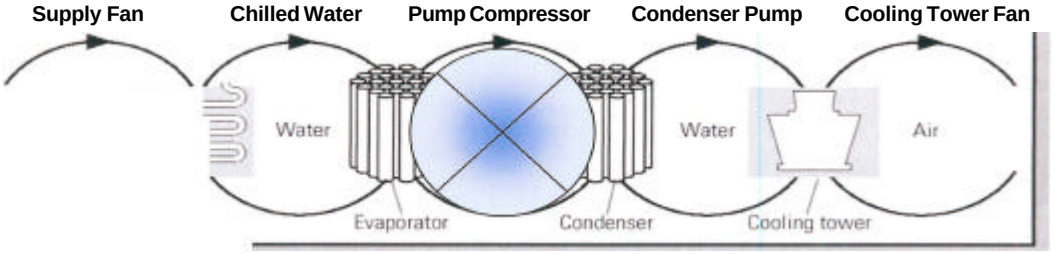
MaxR100™ is a thermodynamic changing enhancement, molecularly bonding metal conditioning product that imparts extraordinary capabilities to any refrigerant in which it is used. ASTM testing validates virtually any requirement of industry and the private sector. Thermal energy moves from left to right through five loops of heat transfer:

MaxR-l00™ thermodynamic changing enhancement



Research from the last few years shows that aggressive Fouling Factor reduction is more beneficial than modest reductions. MaxR100™ bonds with metal surfaces and removes any contamination that may be attached to it in the process. This bond virtually eliminates metal-to-metal contact, oxidation and other problems associated with insufficient lubrication and heat transfer. MaxR100™ reduces energy consumption to run air conditioning and refrigeration equipment, typically in the 15-20% range.

In addition to lowering Fouling Factor levels, MaxR100™ also increases the boiling point of refrigerant, which could be another mechanism by which MaxR100™ beneficially affects the net refrigerant effect. This increase in the boiling point of refrigerant does not depend on MaxR100TM's ability to reduce Fouling Factor. Furthermore, these anti-fouling and net refrigerant effects can be seen as early as two weeks after starting MaxR100™.

MaxR products have been tested to The American Society of Heating, Refrigeration and Air-Condition Engineers (ASH RAE) test for Miscibility, Metal Compatibility and Floc test. MaxR100™ has also been tested to ANSI/ASH RAE 37-1988 and American Refrigeration Institute, ARI Standard 340/360-2000 without issues.

MaxR100™ is produced in four types of refrigerant oils to be compatible with the base oil that is currently used in the refrigeration and air-conditioning systems. MaxR100™ is the only safe product, to our knowledge, for use in ammonia charged gas refrigeration systems.

Energy Efficiency Ratio
EER = Btu of cooling output / watt-h of electric input = Btu/h of cooling output / W of electric power input

Coefficient of Performance (COP)
COP = Cooling /Heating Capacity Output Energy Input = EER /3.412 Btu/watt-h