



An explanation of how Cold-Plus™  
Improves the efficiency of Air  
Conditioning and Refrigeration Systems



# What is Cold-Plus™?

Cold-Plus™ is a patent pending technology that differs from any other product on the market. It is a second generation product made specifically to address efficiency in Air Conditioning and Refrigeration Units.

- Cold-Plus™ requires a one-time only injection for all systems.
- Cold-Plus™ is compatible with all present compressor lubricating oils and Freon.
- Cold-Plus™ has third party testing that shows full compatibility with all AC and Refrigeration components.
- Cold-Plus™ contains no chlorinated or sulfonated compounds.
- Cold-Plus™ is environmentally friendly



# How does Cold-Plus™ improve Efficiency?

The efficiency issues that are addressed are :

- Oil Fouling
- Amp Draw
- Startup Amp Spikes
- Refrigerant Flow
- Heat Transfer
- Pool Boiling



# Oil Fouling

- Refrigeration systems with mechanical compressors circulate 1-5% of their compressor lubricating oil with the refrigerant that is circulated throughout the system
- This recirculating oil over time forms a sticky/lacquer-like substance, which fills the pores of the copper tubing carrying the refrigerant to and from the evaporator and condenser, over and over again during the refrigeration cycle...
- Due to the insulating properties of oil, the oil insulates the heat transfer to the metal tubing walls impeding heat exchange.
- Oil fouling degrades system performance by up to 30%\* and higher.
- All compressor oils available today cause Oil Fouling, impeding heat exchange.

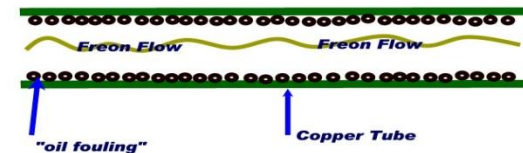
\*ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Experts)



# Oil Fouling (cont.)

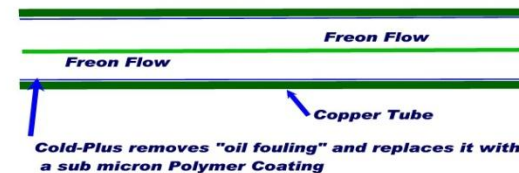
- **Cold-Plus™** technology removes and eliminates the Oil Fouling on refrigeration tubing inner surfaces; acting as a catalyst without chemically changing itself, the refrigerant, or the lubricating oil.
- This process allows the **Cold-Plus™** polymer to permanently bond to the metal surfaces eliminating further Oil Fouling and improving heat exchange.

## "Oil Fouling" Impedes Heat Transfer



Oil layer attached to heat exchanger wall impeding heat transfer

## Cold-Plus Improves Heat Transfer



Activated polar molecule displacing oil molecules facilitating better heat transfer



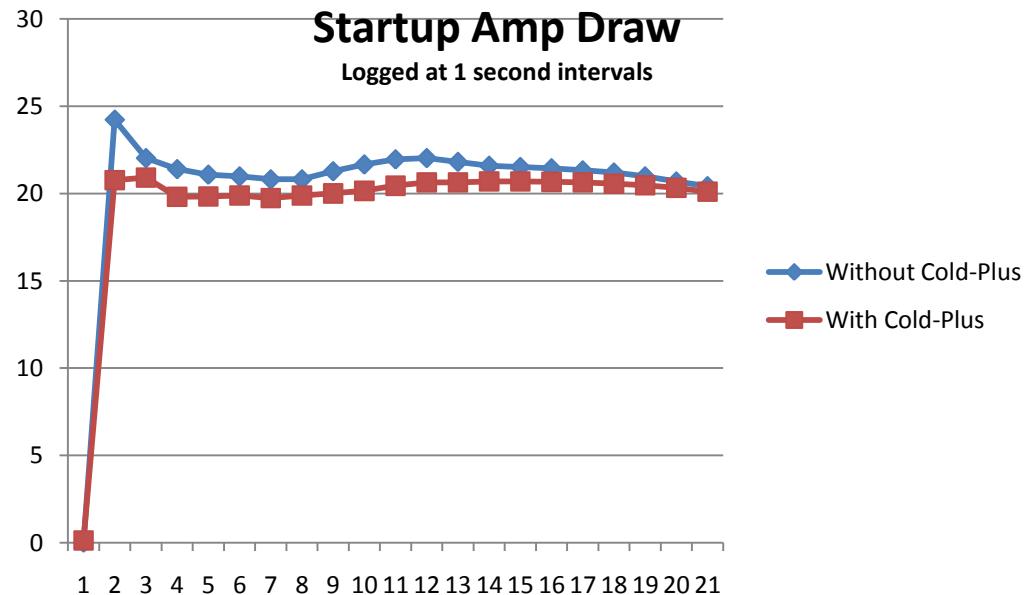
# Amp Draw

- Cold-Plus™ reduces the operating amp draw of the compressor by reducing friction on the components of the compressor and improving heat exchange.
- Cold-Plus™ allows the compressor to operate at a lower temperature and pressure.
- Cold-Plus™ reduces the compressor noise level by 3-5 decibels



# Startup Amp Spike

The addition of Cold-Plus™ virtually eliminates the amp spike that occurs when the compressor starts. This is important because the majority (80%) of the wear occurs during the compressor startup. Virtually eliminating the spike will add to the longevity of the compressor and reduce the amps required to start the compressor.



# Refrigerant Flow

The addition of Cold-Plus™ to the system will increase refrigerant flow by 5-8%.

Increased refrigerant flow increases unit capacity improving heat transfer and efficiency.



# Heat Transfer

Air Conditioning and Refrigeration are all about the transfer of heat and reduction of humidity.

Cold-Plus™ improves the heat transfer process by:

- Removing Oil Fouling
- Bonding a polymer to the metal tubing and parts to improve heat transfer
- Increasing refrigerant flow



# Pool Boiling

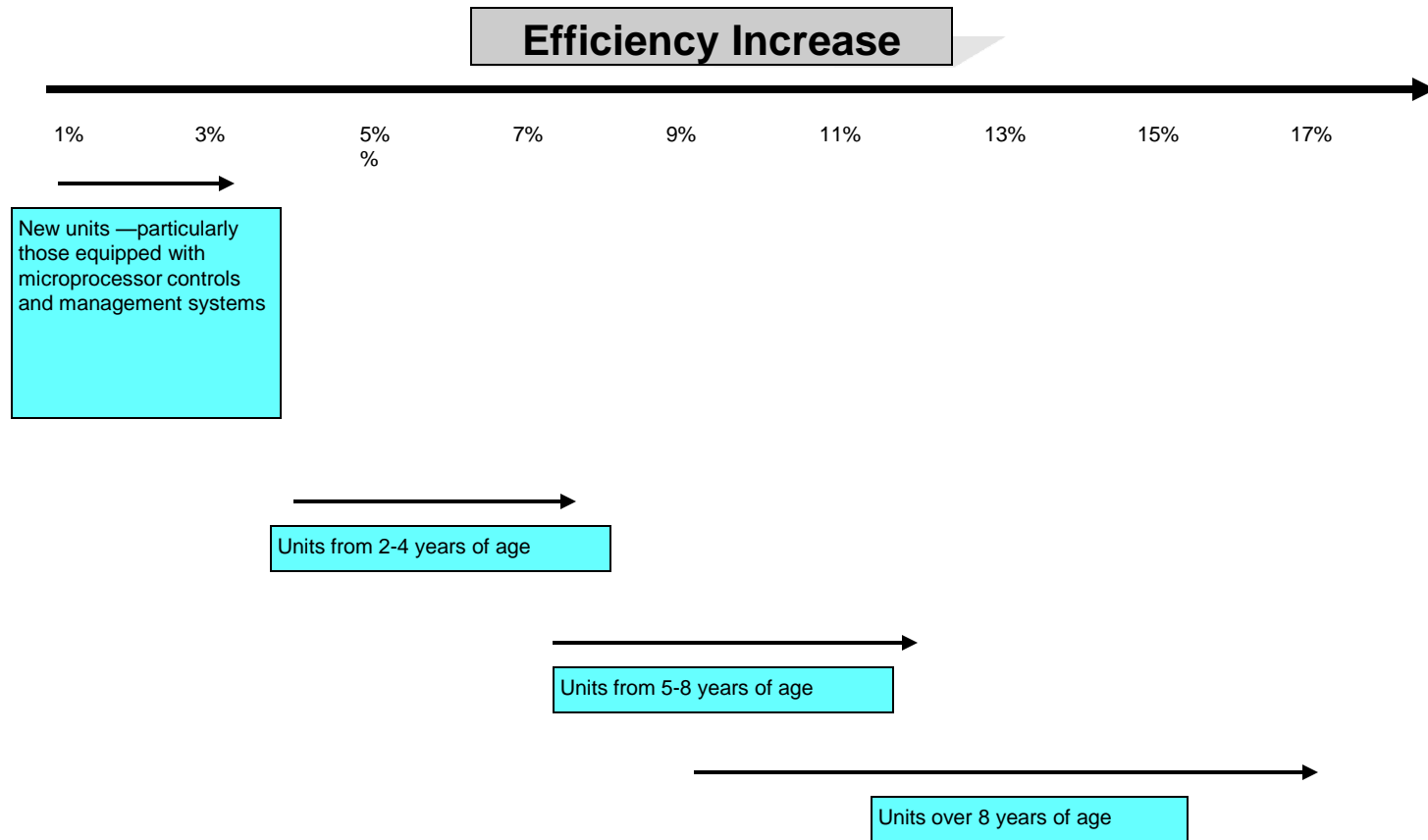
Pool Boiling for the purpose of this discussion is the point in the evaporator where the liquid Freon begins to change to a vapor state. As the pressure drops the liquid Freon begins to form tiny bubbles similar to what you can observe as you boil water. The bubbles start small and then get larger as the process of vaporization continues. It is the pool boiling and vaporization process that reduces the temperature of the evaporator coil and allows heat transfer from the air flowing through the coil to the Freon inside.

There are many factors that effect the pool boiling within the evaporator. Aside from pressure and temperature there are studies indicating that the lubricity of lubricating oil and the quantity within the evaporator also effect pool boiling. In the case of Cold-Plus™ ETL testing indicates the annular flow extends deeper into the evaporator coil to allow for better heat transfer.

We make no claims as to the causal relationships that allow Cold-Plus™ to lower the temperature of the supply air and reduce the relative humidity..



# Cold-Plus™ Product Expectations



## Cold-PlusT Cost Savings

Cost savings are generated from the following formula:

$$\text{Efficiency Increase} \times \text{Operating Hours} \times \text{Cost per KWH}$$

What is important to note here is that only the efficiency increase is attributable to Cold-PlusT. As part of the efficiency increase there will be a reduction in operating hours necessary for the unit to fulfill the requirements.

There are other issues that contribute to cost savings that are not included in the efficiency increase

- Reduces future repairs—compressors run longer due to decreased amp draw and start up spike
- Eliminates Oil Fouling forever—the unit will continue to operate at the improved efficiency for the remainder of the units useful life.

## ROI

By using the cost savings model and knowing the installation cost it is possible to produce an estimated Return on Investment for installing Cold-PlusT. Typical AC installations will produce an ROI of less than 12 months while Refrigeration installations will be considerably less than one year. Heat pumps are considerably less than one year because the benefits are accrued on both the heating and cooling cycles.

