CERMA® STM-3

A/C AND REFRIGERATION SYSTEMS

BLUE ICE

REDUCING ENERGY COSTS AND EXTENDING EQUIPMENT LIFE ONE UNIT AT A TIME

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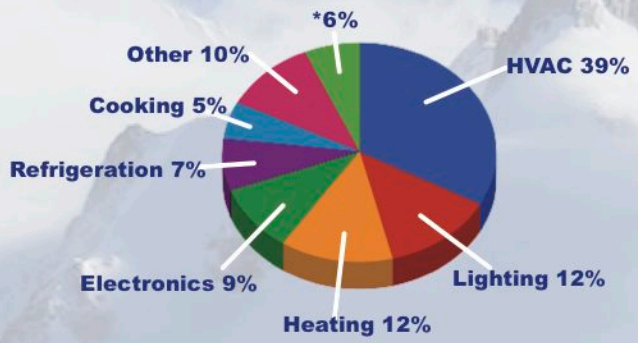
Cooling the Business

Efficient A/C and Refrigeration in a business can significantly reduce electricity cost.

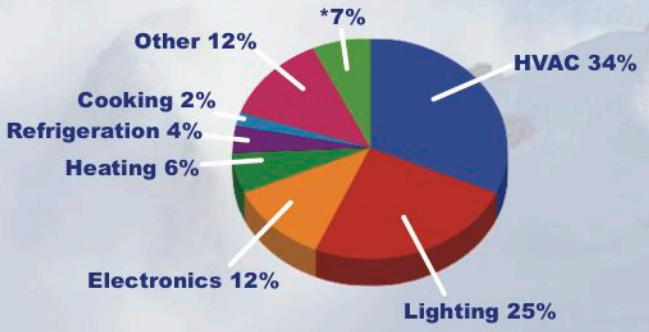
Air-Conditioners • Refrigerators • Freezers • Cold Rooms

Residential Building Total Energy Use



Source: DOE, 2008 Buildings Energy Data Book, Section 2.1.5, 2008.
*This pie chart includes an adjustment factor used by the EIA to reconcile two datasets.

Commercial Building Total Energy Use



Source: DOE, 2008 Buildings Energy Data Book, Section 3.1.4, 2008.
*This pie chart includes an adjustment factor used by the EIA to reconcile two datasets.

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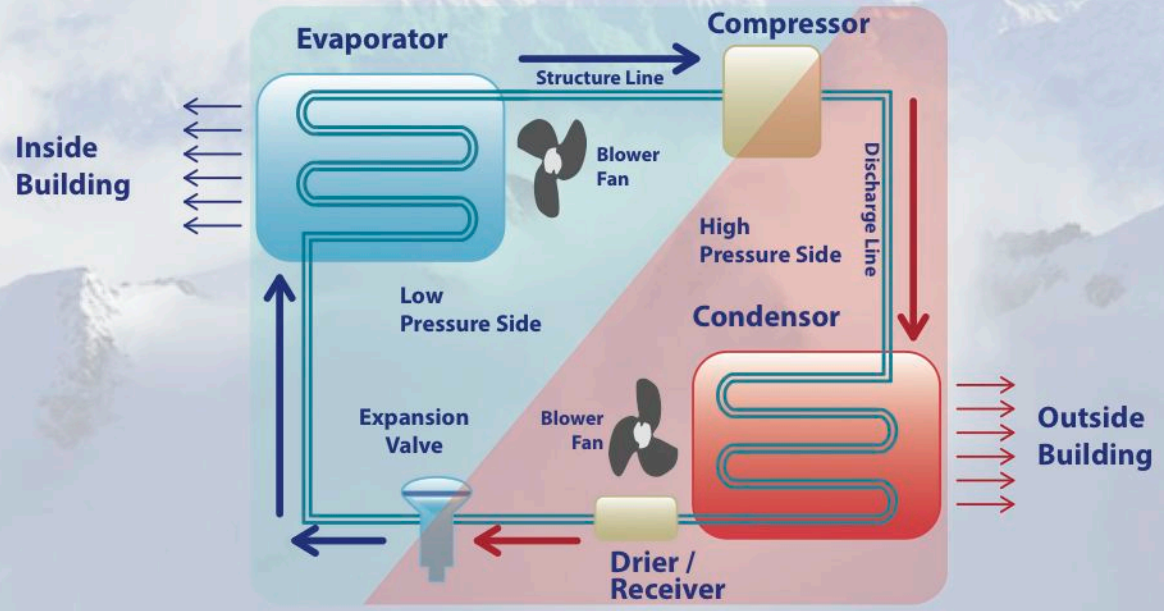
How Cool Works

Refrigeration is a process of heat absorption, where as heat is absorbed in one place and moved to a more desirable place.

Refrigeration systems use many different approaches to achieve same effect, in this illustration we will discuss compressor style systems using R-22, R410A, etc. Compressor A/C systems compress the refrigerant, which flows to the condenser, where it absorbs heat. It then moves to the expansion valve, and the evaporator, where heat is removed, and it is finally sucked by the compressor again.



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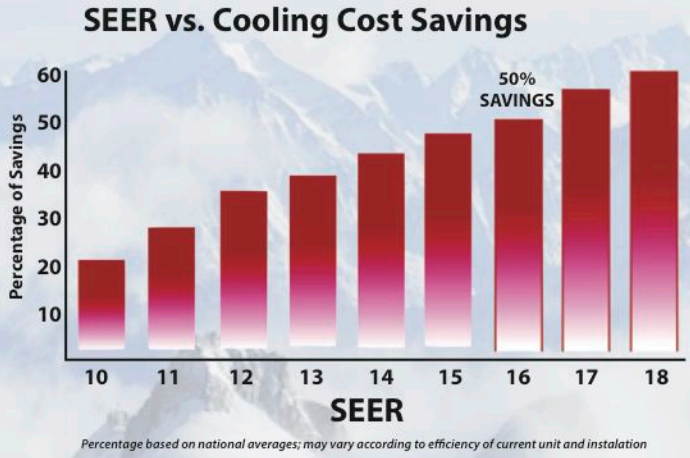
Cooling Efficiency

A system must remove the heat in order to create the cold, HEAT TRANSFER.
Systems (even new) can have a much lower heat transfer rate then their official rating.



For every unit of SEER reduction, a unit will run at approximately 5% less efficiency.
This reduction translates into a 10% increase in energy usage (kWh)!
In addition, there is more to energy consumption than kWh -- STARTUP.
Startup demand is the maximum amount of electricity used by an air conditioning system and can account for up to an additional 15% of energy costs.

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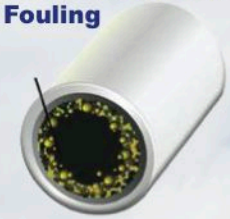
What's not Cool?

1. MOISTURE inside the lines: Water freezes as it passes from the high pressure side to the low pressure side, significantly reducing the heat transfer rate.

More on Moisture
click here

Decreased Flow from Oil Fouling



2. OIL FOULING: Every system needs oil to lubricate the compressor. However, the oil attaches to the metal coils and reduces heat transfer.
ASHRAE Handbook, Refrigeration - oil fouling reduces efficiency by up to 30% in first 5 years.

3. LUBRICATION: Proper lubrication is continuously necessary for the compressor to run at peak efficiency. Oil does not stay in the compressor, it continues to flow through the entire system. Any temporary or permanent lack of lubrication will dramatically lower compressor and heat transfer performance.

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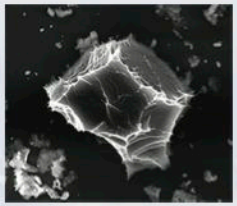
The Moisture Fix

Moisture in the System



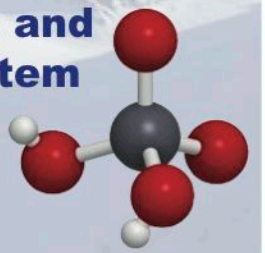
Ice Crystals Restrict Refrigerant Flow, and Restrict proper Heat Transfer, a direct cause for Loss of Cooling Efficiency

Clear Flow after CERMA A/C

Expansion Valve

As the refrigerant passes from the high side to the low side via the expansion valve, any moisture in the freon flow freezes, forming ice crystals and thus restricting the flow of the refrigerant and lowering the heat transfer efficiency.

The unique composition of CERMA A/C, changes the state of the H2O molecule inside the closed A/C system, breaking the bond between the Hydrogen and the Oxygen atom -- NO MORE WATER equals no more ice within the system thereby increasing efficiency and decreasing the cost of operation.



With all the moisture and water extracted from the system, the refrigerant is clear to do what it needs to do -- transfer the heat efficiently across the entire system.

More on the Science
click here

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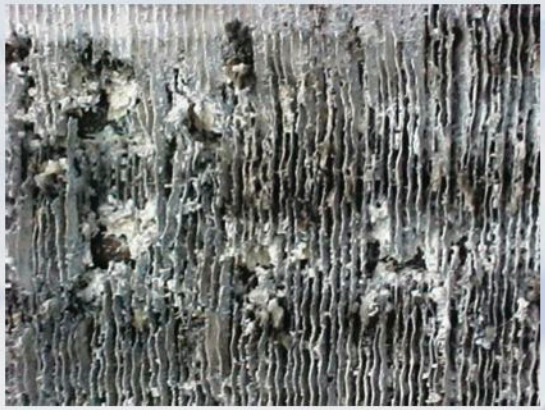
No Water, No Acid
No Corrosion



Moisture inside the system can also turn into acid and cause corrosion, thus breaking down the motor windings and a complete failure of the system.

With CERMA A/C, the removal of the moisture dramatically reduces acid causing corrosion and increases the life of the system.

- **Less Maintenance**
- **Lower Repair Costs**
- **Longer System Life**

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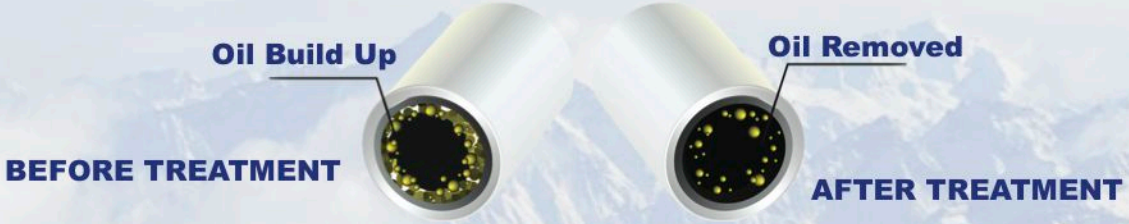
Remove Oil Fouling

Every system needs oil to lubricate the compressor.
However, the oil attaches to the metal coils and reduces heat transfer.
ASHRAE Handbook, Refrigeration - oil fouling reduces efficiency by up to 30% in first 5 years.



- **CERMA A/C penetrates the inside of the a/c coils as it is introduced into the system, creating Cerma's "SiC" coating along the entire surface of the inside of the coils. Over time, CERMA A/C will penetrate and cure on the surface of the coils, stopping the ability for the oxidized oil in the refrigerant to build up on the metal coils and reduce heat transfer.**

- **Cerma's technology is based on 14 years of real world sales in the automotive and oil industry. Cerma's SiC coating works as a high performance surface protector due to its properties of being able to withstand extreme temperatures.**

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Lubricating the System

Proper lubrication is continuously necessary for the compressor to run at peak efficiency. Oil does not stay in the compressor, it continues to flow through the entire system. Any temporary or permanent lack of lubrication will dramatically lower compressor and heat transfer performance. Most importantly, proper lubrication allows the system to start up quickly and efficiently and keep the kWh startup demand low.

Clean • Restore • Lubricate • Protect

- **CERMA A/C is a proprietary formulation blended to create a high performance lubrication for HVAC and Refrigeration units.**

- **CERMA A/C added to the a/c oils will create a free flow environment for the oils to continuously and freely lubricate the entire system.**

- **CERMA A/C Protects New... Revives Old by revitalizing the refrigerant oils ability to lubricate the system.**

- **CERMA A/C lowers system startup energy demand by properly lubricating the compressor.**

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Benefits

When your A/C unit is working less, dollars are going straight to your pocket. CERMA A/C provides better performance and enhanced efficiency / heat transfer. Improved efficiency up to 70% adds up to Power Savings of up to 15% - 40%.

- Improved Efficiency
- Shorter Compressor Cycle Times
- Power Savings
- Improved Heat Transfer
- Reduces Internal Moisture and Acid Buildup
- Quieter Compressor, Reducing Noise and Vibration
- Revives Hard Start Units
- Corrects the need to change Saturated Air Dryer Modules
- Removes Oil Fouling and Cleans Lines
- Improves both New and Old Systems
- Provides hard deposit resistant micron coating to the lines
- Allows System to work at Maximum Efficiency
- Eco-Friendly and Organic

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The Results

CERMA A/C - SAVE, SAVE, SAVE
Run Colder, Run Efficient, Run Less!

Runs Efficient

Before Cerma
2.68 kW

After Cerma
1.88 kW

42% Reduction

2 Ton 14 Seer Unit

Before Cerma **After Cerma**

Runs Colder

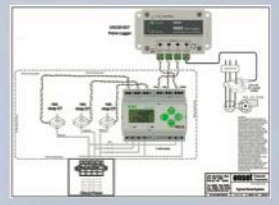
29% increase in latent heat absorption

Runs Less

Day to Day Reduction

Total Reduction in kW week to week - 17%

M	28.18%	
Tu	21.76%	
W	14.87%	
Th	7.75%	
F	8.30%	
S	22.25%	17.19%



5-ton 3PH 208V Freon Compressor

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Moisture in the System

The main problem of moisture within the system is as the freon and oils containing saturate moisture content pass the high pressure zone through the expansion valve, there is a large pressure drop, and any moisture within the refrigerant will freeze.

These newly formed ice crystals will then travel with the fluids to the evaporator where the refrigerant will absorb the heat.

The problem, ice does not effectively absorb heat as fast and efficiently as the liquid refrigerant, which means the system is working less efficiently and running longer to the obtain the same cooling effect.

More Run Time = More Cost

In addition, more heat generated at the compressor will cause oxidation of the lubricants within the system and increased wear and tear on equipment.

Moisture in a refrigeration system, if left unchecked will shorten the life of the equipment, cost more to run, and require increased maintenance over the life of the unit.

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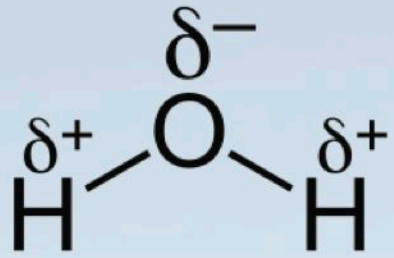

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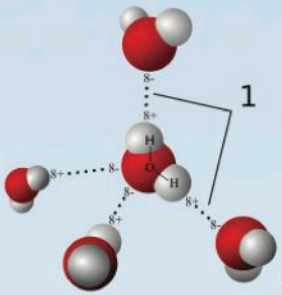
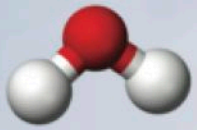
The Science



The dipole in water is caused by the difference in electronegativity between Oxygen and Hydrogen. (1) Oxygen is more electronegative than Hydrogen, so is better able to attract electrons towards itself. This results in the electron pair in the covalent O-H bond being more localized on the Oxygen atom, corresponding to less electron density on Hydrogen. Due to the additional electron density, the Oxygen is slightly negatively charged, while the lack of electron density on Hydrogen makes it slightly positively charged. Hydrogen has a single proton, while Oxygen has 8, resulting in greater positive attraction for negatively charged electrons, outweighing the shielding effect of the full 1s shell of Oxygen.

(2) Cerma products are (-) charged electrons that overpower the attraction of hydrogen to oxygen, so the hydrogen is pulled like a magnet, since Cerma has a strong charge verses Oxygen's weak charge, the surrounding positively charged hydrogen atoms are drawn away from the oxygen atom and bond with Cerma to form a new substance (no longer chemically H2O). This relieves the problem of H2O forming ice crystals within the refrigeration system and improving efficiency of heat transfer.

Cerma is the solution to put an end to moisture problems within any refrigeration system. It took 10 years of research and development, 5 years in practical use in some of the harshest environments as well as testing that included systems as small as a car a/c all the way up to a 100-ton system in Florida and Arizona. In use Cerma has seen results in savings of over 50% in normal production time & costs of a ice production factory located in Australia, saving the owners both time and cost of production, not including saving of future wear and tear of the equipment.



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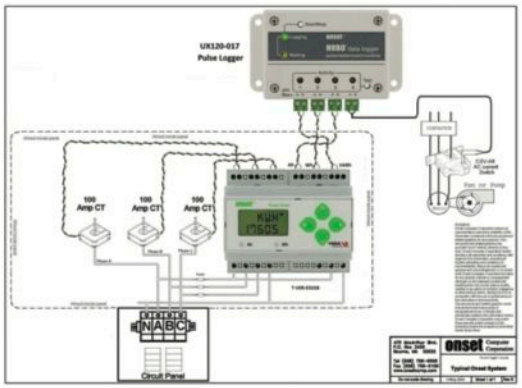
CERMA BLUE ICE TEST

On 5/30/13 Cerma began a two-week monitoring of a walk in freezer cooled by a 5-ton 3PH 208V Freon compressor owned by Villarinas's Pasta and Find Food of Danbury, CT. Since the freezer was indoors, the ambient temperature was constant. The first week we recorded existing energy consumption. Without disconnecting or stopping any monitoring equipment, on the seventh day we injected CERMA BLUE ICE into the Schrader Valve on the low pressure line and continued monitoring energy consumption for another week.

We used a power logging system to monitor the energy consumption before and after adding the CERMA BLUE ICE treatment. The system consisted of a HOBO UX120 Pulse Logger, an E50B2 Energy and Power Meter, a 20 AMP Mini Split-core A/C Current Transformer, an A/C Current switch, and HOBOware Pro Data Logger Software.



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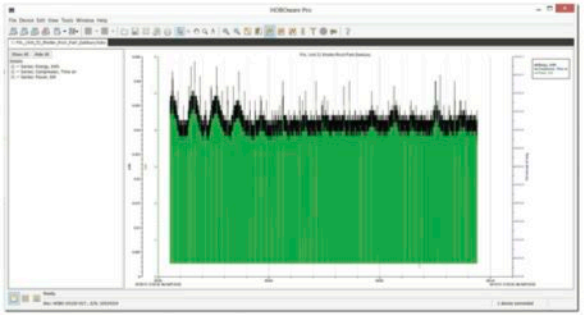
Upon initial retrieval, the data points can be almost overwhelming, resembling a "White Noise" type graph. We are recording Ah, Wh and VARh, which are computed into PF, Volts and Amps averaged across three phases, and data points are calculated and recorded every 30 seconds. This results in over 20,0000 data points each week. The graph below represents the massive data stream:



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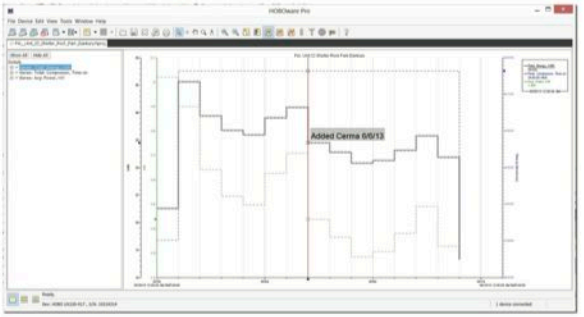
TOTAL ENERGY per DAY in kWh

In order to understand the results, we apply filters to the data stream. The filters tabulate all data points within a one-day period and present a dashed line representing each day. The graph below starts on Thursday 5/30/13 and ends on Thursday 6/13/13. The vertical red line represents Thursday 6/6/13 when the CERMA BLUE ICE was injected into the system. The graph below tabulates Total Energy / day in kWh. It becomes graphically obvious that the second week's Total Energy / day is much lower than the first week's. The first day and last day kWh readings are artificially low because we only recorded a partial day. Those data points will be ignored in our summary results (actual daily numbers are presented in spreadsheet format at the end of this document).



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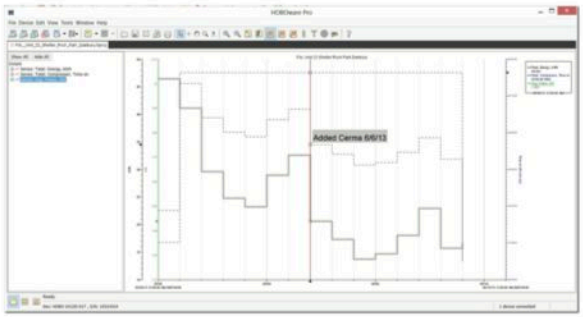
AVERAGE POWER per DAY in kW

Finally we take a look at Average Power in kW per day. Although we do not include the first and last partial days of data in the summary results, we actually could have, because kW readings are instantaneous instead of cumulative like kWh readings. Again, it is graphically obvious that the 2nd week's readings are much lower than the 1st week's readings both on a day-to-day comparison and on a week-to-week comparison.



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SUMMARY RESULTS

To summarize our analysis, after disregarding the first and last day partial readings, the following results were present:

Friday-to-Friday:	**Readings dropped 28%**
Saturday-to-Saturday:	**Readings dropped 21%**
Sunday-to-Sunday:	**Readings dropped 14%**
Monday-to-Monday:	**Readings dropped 7%**
Tuesday-to-Tuesday	**Readings dropped 8%**
Wednesday-to-Wednesday:	**Readings dropped 22%**

The varied percentages were based on how often the walk in freezer doors were opened forcing the compressor to recover the cold lost. The longer the doors were kept shut, the more stable the environment remained and readings dropped less because compressor demand remained low and stable. The more the doors were opened, the more loads were placed on the compressor, at which point it took advantage of the CERMA BLUE ICE and Cerma's ability to increase efficiency. It is important to note that under all conditions, there were significant savings.

Week-to-Week, THERE WAS A 17.69% REDUCTION IN ENERGY CONSUMPTION.

The spreadsheet below represents the actual numbers of the data stream:

CERMA A/C AND REFRIGERATION SYSTEMS BLUE ICE

ADDITIONAL BENEFITS

CERMA BLUE ICE will also greatly extend the life of the compressor, allow it to run much quieter, and dehumidify more efficiently because it eliminates the moisture trapped in the system and cleans the coils from the inside. As the CERMA BLUE ICE treatment penetrates the system over the first 90 days, energy savings will INCREASE even further.

CERMA BLUE ICE is not an additive, it is a metal treatment that is added to your cooling system's refrigerant. CERMA BLUE ICE is revolutionary in that it extends your system's life and boosts efficiency.

Benefits:

- **Reduces electrical costs by up to 50%.**
- **Improved lubrication and extends the life of the compressor.**
- **Removes oil fouling (oil deposits that clog your system's tubing preventing heat exchange and reducing efficiency).**
- **Faster delivery of colder vent air thanks to unhindered heat exchange, reducing the length of time your A/C needs to run in order to maintain temperature.**
- **Improves efficiency.**
- **Reduces compressor noise, vibration, and friction wear-and-tear.**
- **Lowers repair costs.**
- **Enhances SEER performance.**
- **Extends equipment life.**
- **Huge return on investment in the first year.**
- **Environmentally friendly, non-toxic, contains no hazardous materials.**
- **Does not void the warranty of any equipment**

CERMA BLUE ICE is a one-time treatment covered by a 90-Day "Hassle Free" Money Back Guarantee. We can also supply MSDS sheets to show that it will NOT VOID ANY WARRANTIES OR TOLERANCES. You deserve nothing less.

For a detailed video on how CERMA BLUE ICE works:

CERMA BLUE ICE Video – click on link and then click on the CERMA A/C Video

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Appendix C

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