

**IceCOLD<sup>®</sup>**

CASE STUDY



November 22, 2010

President  
LOMCO  
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Thank you so much for the opportunity to conduct a proof of performance with the installation of **IceCOLD®** into a Carrier 90 ton Chiller servicing the senior center located at the Beverly Tower, in Montebello, California ( 90640)

The equipment is:  
Carrier 90 ton; Model No: 30GTN090 – 531AL  
Serial Number: 2404F39904

**IceCOLD®** was installed October 28<sup>th</sup>, 2010.  
90 ounces of **IceCOLD®** was installed in divided doses of 45 ounces per compressor sump.

Using a defined protocol methodology, we conducted the Proof of Performance on this installation to illustrate the savings LOMCO will garner as a result of including **IceCOLD®** in their air conditioning systems.

### What is IceCOLD®?

- **IceCOLD®** is a synthetic catalyst that is installed directly into the air conditioning / chiller compressors.
- **IceCOLD® is two catalysts and a lubricity agent.**
- **IceCOLD®** delivers a minimum of 10% [money back guarantee] reduction in air conditioning and refrigeration operating expenses; an overall 12 year average reported by customers of over 20% gain in efficiency.
- **IceCOLD®** has 12 years of performance history with over 15,000 installations to substantiate its performance claims. The product is non-toxic, non-hazardous [no chlorine, sulfur, soap/wax etc.] and contains no petroleum or mineral oil by-products [see attached MSDS]. The technology is compatible with over 90% of all compressor oils [not compatible with R11 and R123 refrigerants].

IceCOLD® has received the 2012 GEIT award from the prestigious Uptime Institute <http://uptimeinstitute.com/>

- as well as formal listing in 2011 with the GSA (Federal Government Services Administration).
- IceCOLD® is **NOT a PROA** and remains the only wholly synthetic catalyst on the market.

## How does IceCOLD® work?

IceCOLD® reverses a condition that ASHRAE calls "oil-fouling". Oil-fouling is the film of oil that builds up on the inner walls of the refrigeration tubing of the evaporator and condenser coils that blocks significant heat transfer. According to ASHRAE, oil-fouling is a condition in which the compressor lubricant globules stick to the refrigeration tubing walls as it circulates through the cooling system.

ASHRAE states that between ½ and 8% of compressor oil circulates through the refrigerant system. As the refrigerant and compressor oil naturally circulate through the condenser and coils, the lubricating oil is attracted to the refrigerant tubing metallic heat transfer surfaces creating a "plaque-like" build-up. This oil-fouling is an effective heat exchange barrier. If this condition is left untreated, your system can experience up to a 30%+ reduction in operating efficiency over its lifetime.

Upon installation, IceCOLD® reverses this process by removing oil-fouling accumulations from the walls of your system's heat transfer surfaces.

IceCOLD® second catalyst causes the refrigerant to evaporate at a lower temperature. This phenomenon, in conjunction with the oil-fouling removal, increases the heat transfer coefficient within your system significantly. With the removal of oil-fouling, the refrigerant is now in direct contact with the (copper tubing) heat transfer surfaces, resulting in significantly cooler air flowing out your system and the thermostat's set point temperature being achieved more quickly.

IceCOLD® also contains a lubricity agent that increases the system's lubricity by as much as 54% - according to the INTERTEK laboratory study. The augmented lubricity means the equipment runs smoother, cooler and quieter requiring less electricity/fuel to operate under normal working conditions.

The report herein outlines the methodology, results of the proof of performance, efficiency improvement and ultimate savings obtained.

## METHODOLOGY

### **Purpose:**

Establish a baseline for energy cost, measure chilled water in and chilled water return temperature before IceCOLD® is installed. Measure the difference between cost of operating unit before IceCOLD® and after IceCOLD® to determine efficiency improvement and expected savings for LOMCO.

**Tools Utilized:**

- 1 x U12 Data Logger (Onset Computer)
- 2 x Temperature Sensors (2 on the evaporator barrel)
- 1 x CT (Current Transducer) Probe

**Probe Placement:**

- Channel 1: CT Probe (lower amp reading) placed on the line side voltage on the Compressor
- Channel 2: Temp probe (lower temp reading) placed on the "chilled water in" close to the chiller barrel
- Channel 3: Temp probe (higher temp reading) placed on the "chilled water return" close to the chiller barrel

**Units Measured:**

- Amperage: Current draw on the compressor unit
- Temperature: One each on the return and supply chilled water connections on the evaporator barrel

**Volume of IceCOLD® Installed:**

Using the standard formula, 90 ounces of IceCOLD® were installed on October 28th, 2010.

**FINDINGS**

**Baseline Period: October 12<sup>th</sup> through October 27<sup>th</sup>, 2010**

**Post Installation Period: October 28<sup>th</sup>, through November 19<sup>th</sup>, 2010**

Comparison days used to illustrate improvement and savings were:

Wednesday October 13<sup>th</sup>, 2010 to Wednesday November 17<sup>th</sup>, 2010

Thursday October 14<sup>th</sup>, 2010 to Thursday November 18<sup>th</sup>, 2010

These dates were selected wherein ambient outdoor temperatures were similar, the nature of activities in the building would be similar and therefore an appropriate day to day comparison for pre and post improvements.

**WEDNESDAY TO WEDNESDAY**

15.6673Base

12.59101Post

3.076298Delta

**19.63514%LESS POWER REQUIRED**

Wednesday October 13<sup>th</sup>, 2010: 15.6672 Average Amp Usage for the 24 hour period

Wednesday November 17<sup>th</sup>, 2010: 12.59101 Average Amp Usage for the 24 hour period

Delta Change: 3.07298 or

19.63% LESS POWER required to operate the Chiller

## THURSDAY TO THURSDAY

20.66869

14.78481

5.883885

28.46762%LESS AMPS

Thursday October 14<sup>th</sup>, 2010: 20.66869 Amp Usage for the 24 hour period

Thursday November 18<sup>th</sup>, 2010: 14.78481 Amp Usage for the 24 hour period

Delta Change: 5.883885

28.46762% LESS POWER required to operate the Chiller

### **On average, the chiller will use 24% LESS POWER to cool the space.**

Difference in savings day over day pertain to increased internal heat load inside the building, increase in ambient outdoor temperature and/or increase in humidity. By normalizing the data, the comparisons show an overall improvement of 24% on average.

#### **Water Temperatures:**

Delta Baseline 3.259F

Delta Post Installation 0.429F

Improvement 2.83F Improvement

Narrowing of chilled water temperatures

The delta between the Chilled water IN and the Chilled water OUT on baseline was approximately 3.259F.

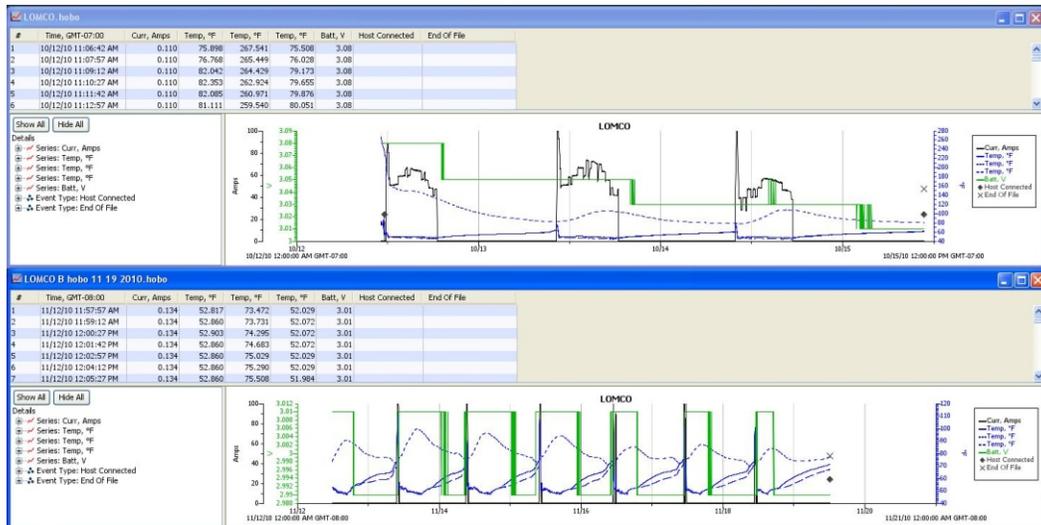
The delta between the Chilled water IN and the Chilled water OUT on post installation was approximately 0.429 F

We have a net improvement of 2.83F. The narrowing of the temperatures between both chilled water in and chilled water out means the unit is able to reach set point more quickly, meet the onboard standards set by the Carrier Unit and more importantly hold that temperature for longer, cooling the space more efficiently for less cost. This narrowing of temperatures is the reason why the alarms that were constantly a source of challenge for the HVAC team have now been eliminated and why the unit is running smoother and without issues.

## NOTES

California licensed chiller technician Mr. Skip Hicks provided additional information about the chiller prior to installation of IceCOLD®; namely, that the system was the lead unit with the lag unit taking over when the chilled water temperature could not be met or external-internal heat load conditions required additional support to cool the space. Secondly, the system was experiencing multiple 'alarms' caused by the unit's inability to reach set point for the chilled water temperature in a timely manner to meet the onboard programming requirements set by Carrier.

- Since the installation of IceCOLD®, Mr. Hicks has confirmed the following:
- Oil has returned to the oil reservoir clearly indicating that the oil fouling has been eliminated with the oil now home where it belongs in the oil sumps/reservoirs. Prior to installation of IceCOLD®, the site glass on the unit showed oil levels at 25% capacity. Following full catalytic reaction, the site glass now shows 50% oil level which is acceptable to the Carrier unit and in keeping with acceptable operating conditions. This increase in the site glass clearly shows that the oil fouling that was a part of the decrease in performance of this chiller unit has been eliminated making it more efficient.
- The alarms that were a constant source of irritation due to suction superheat have now been reduced to NONE. This is the result of the second catalyst reducing the evaporation point of the refrigerant allowing the set point of the chilled water to be met faster and the chilled water temperature to be sustained more evenly.
- Unit is continuing to run smoothly and without issues.
- The alarms were caused by the superheat negatively affecting the compressor making it difficult for the unit to chill the water quickly enough to meet the standards set by the onboard software. Since the inclusion of IceCOLD® the superheat has been improved allowing the unit to meet the chilled water temperature requirements in a timely manner and keeping the system 'error free'.





As you can see from the picture above, the baseline period shows high amperage usage (shown by the black lines with uneven cooling on the chilled water IN and OUT (shown in blue) whereas AFTER IceCOLD® was installed the black lines have reduced in number and width and the blue lines show an even narrow delta indicating the cooler water temperature and more even distribution of chilled water IN and OUT. The unit is now operating in a more even manner using less power to do so. The above pictures are a snap shot in graph form of the before and after improvements of the IceCOLD®.

**Summary:**

**Performance Improvement:**

24% Total Efficiency Improvement

**Improved overall efficiency:**

While there is no attempt on our part to attribute a financial value to the improvements outside of the reduced cost in operating this unit, it is evident that the performance improvement as it relates to improved super heat transfer, reduced alarms and maintenance time, improved water temperatures has made this unit less time consuming to operate, more efficient in cooling the space and will as a result require less maintenance and less wear and tear on the chiller .

**Conclusion:**

In conclusion, the LOMCO Property that the expected savings on this unit is 24% and will continue year after year for the lifetime of the equipment. As IceCOLD® technology is a one-time installation; there are no ongoing monthly costs, re-installation, or other such expenses making this investment a tremendous savings mechanism for LOMCO Property.

Our gratitude to Mr. Steve Hicks who participated in this testing and provided exceptional chiller knowledge and experience to us. His presence was both a delight and critical to the success of the project. Registered professional refrigeration engineer Mr. Mark Bedford of IceCOLD® is very impressed with Steve's professionalism and extensive skills.

we look forward to further installations of IceCOLD® for LOMCO Property customers to save money, reduce carbon emissions, and extend the life of their equipment across all their facilities. We are honored you are part of the sustainability of our Planet.

Sincerely,

Mark Bedford

Authorized Distributor of



Cc: Skip Hicks

*(edit: some stats, etc. updated to 6-2014)*