DVC Solutions
Energy and Water Efficiency

THE STATE OF TEXAS
FRIGI-TECH CHILLER EFFICIENCY EVALUATION

INTRODUCTION

This evaluation was performed for the State of Texas. The purpose of the evaluation was to determine if Frigi-Tech refrigerant oil additive saves energy when installed in a centrifugal. Secondly, if the product saves energy, then analyze the data to determine what percentage of savings was achieved.

The evaluation was performed on a 1,250 ton Trane centrifugal, model number CVHB-155NH. This chiller was installed in May, 1982.

The base line data was collected for two weeks. The following data was collected at one hour intervals: chilled water supply temperature (CHWSUP), chilled water return temperature (CHWRET), condenser water supply temperature (CDWSUP), condenser water return temperature (COWRET) refrigerant temperature in the evaporator (FREON), pneumatic pressure (PSI) to the vane actuator (VAKEPRES), kilowatts (KW), and megawatt hours (MWH). This data was used to calculate instantaneous tons and KW per ton. One accumulator was set up in software; kiloton hours (KTONHRS). By comparing the megawatt hours accumulator and the kiloton hour accumulator a BTU per watt (BTUWATT) register was set up. The intent of the data collection was to identify and quantify energy savings. By comparing power consumption and tonnage (i.e., input vs output) before the Frigi-Tech oil additive was installed a base line was established.

A refrigerant oil sample was sent to a laboratory for spectroanalysis before baseline data was taken. Another oil sample was taken after two weeks of base line run time. The Frigi-Tech was installed, then a third oil sample was taken after two weeks of run time.

The data was collected for two weeks after the Frigi-Tech oil additive was installed. The same calculations were made to establish the new BTU per watt parameter.

This evaluation was not a controlled laboratory evaluation. It does not represent a wide range of units and is limited statistically to a small sample.

REQUIRED INSTRUMENTATION

Permanent Equipment

1 - Potential Transformer - 60 HZ, 1.2 WX accuracy at 100% rated voltage, 15,000 volt test rated, 4,200 volt primary 120 volt secondary, 3 phase.

2 - Watt Transducer Model MM128-1, provides pulse output ("M) and 4-20 me output for Instantaneous demand (KW).

3 - Current transformers - Model 601T-102, insulation class .6KV, 20KVBIL.

Wire, Connectors and Fittings

Removable Equipment

1 - Andover Microprocessor, Model AC8, 115 VAC, 48K RAM, 64K EPROM, RS232C Communication Interface, 16 inputs/8 outputs.

4 - Precon Water Temperature Sensors, (well insertion type) 10,000 ohm thermisters .36^{o} F accuracy over full range, field celebration (in Andover software) to .1^{o} F accuracy at the temperatures of this application.

1 - Precon Oil Sump Temperature Sensor (strap on) 10,000 ohm thermister .36^{o} P accuracy.

1 - New England Instruments Pressure Transducer (pressure drop for flow calculations) 4-20 ma output 0-1011 water column.

1 - New England Instruments Pressure Transducer (for pneumatic vane actuator monitor) 4-20 ma output 0-30 psig.

1 - Power Supply, 115 volts to 24 VDC

CONCLUSIONS

We compared the baseline data with the evaluation data after two weeks of runtime.

The average of the data collected:				
	Baseline	**Frigi-Tech**	**Change**	**%**
Chilled Water Supply Temperature	**37.00**	**36.96**	**-.04**	**-.11%**
Chilled Water Return Temperature	**45.71**	**45.09**	**-.62**	**-1.36%**
Condenser Water Supply Temperature	**77.81**	**76.73**	**-1.08**	**-1.39%**
Condenser Water Return Temperature	**83.55**	**81.87**	**-1.68**	**-2.01%**
Evaporator Refrigerant Temperature	**31.61**	**32.62**	**1.01**	**3.20%**
Pneumatic Acuator Pressure (PSI)	**10.63**	**9.87**	**-.76**	**-7.15%**
Tons Produced	**583.04**	**544.13**	**-38.91**	**-6.67%**
Kilowatts per Ton	**.962**	**.928**	**-.034**	**-3.53%**
Kilowatts Demand	**561.17**	**505.40**	**-55.77**	**-.11%**
Accumulators:				
Kiliton Hours	**210.15**	**198.88**	**-11.27**	**-5.36%**
Megawatt hours	**179.10**	**160.30**	**-18.80**	**-10.50%**
BTU per Watt	**14.00**	**14.88**	**.88**	**6.29%**

This evaluation was not designed to determine how much savings were achieved by improved lubricity or improved heat exchange but the data indicates improved heat exchange is a factor.

Close analysis of hour by hour data shows savings from 1% to 11%. 'the dynamics of a chiller make small window comparisons very difficult, therefore, the project description was developed with a two week period to average out some of the variables.

The significant indicator of the test was BTU per Watt. The energy savings was 6.29%.