EnSaTEQ, Inc

The ENergy SAvings TEQnology Company

PROATEQ™ Laboratory Tests

In November of 2001, EnSaTEQ, Inc., employed the services of the University of Tennessee, Thermal Science Research Center (TSRC). The TSRC is a part of the Oak Ridge National Laboratories (ORNL), now operated by the University of Tennessee. The TSRC is a certified Energy Testing Laboratory (ETL).

EnSaTEQ, Inc., asked the TSRC to evaluate PROATEQ™, Polarized Refrigerant Oil Additive (PROA), in its thermal test chamber to determine the performance improvements of air conditioning systems treated with the PROA. The TSRC is conducting the tests using American Refrigeration Institute (ARI) criteria.

Under the ARI criteria, the units are tested in steady-state and are not allowed to cycle. The condenser side of the unit is exposed to 95 degree F. air. The evaporator side of the unit is fed a constant supply of 80 degree F. air into the intake side and the temperature drop of the air is measured after it crosses the evaporator coil. The unit does not cool a volume of air and is not allowed to cycle as it normally would.

Also, EnSaTEQ, Inc., wanted to establish the fact that the addition of PROATEQ into an air conditioning system does not change the composition of the compressor oil and has no harmful effect on the system. The Center For Biomarker Analysis, another of the University of Tennessee, ORNL laboratories, was asked to evaluate the chemical composition patterns of compressor oil, before and after the addition of PROATEQ. The TSRC took an oil sample from one of the air conditioner systems before the addition of PROATEQ, and again after the PROATEQ was added and the unit had been run for over a week. TSRC provided the samples to the Center For Biomarker Analysis. The Center For Biomarker Analysis did a Mass Spectrometer analysis on the two samples of the oil and compared the results. There was no change in the chemical composition pattern of the oil before and after the addition of PROATEQ.

After the tests are concluded, a final formal report will be written and provided by the University of Tennessee, ORNL laboratories. In the interim, included are the preliminary reports of the TSRC and the Center For Biomarker Analysis.

THE UNIVERSITY OF TENNESSEE

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April 30, 2002

Doyle Meyers
EnSaTEQ Inc.
Woodville, AL 35776

Dear Doyle,

Please find enclosed a synopsis of the testing we performed on the GE Zoneline 5000 heat pump and the Whirlpool air conditioner. Please call with any questions.

Truly Yours,

Ron Domitrovic

Cc: W.S. Johnson

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Synopsis of Testing for EnSaTEQ Inc.—Unit #1

-as performed at the Thermal Science Research Center
Department of Mechanical Engineering
University of Tennessee, Knoxville

Prepared by: Ron Domitrovic R.D.

Model : General Electric Zoneline 5000 heat pump
Model #: AZC512DBV1
Serial #: aa860076
Nominal capacity: 1-ton
Rated heating capacity: 11,800 Btu/hr
Rated heating COP: 2.7
Rated cooling capacity: 12,200 Btu/hr
Rated cooling EER: 8.7
Refrigerant charge: 40.9 oz R-22
Oil charge: 500 cc (mineral)

The above described General Electric heat pump was tested at two cooling and one heating condition prior to and after the injection of the Proateq refrigerant oil additive. The unit was installed in a two-room psychrometric testing chamber where indoor and outdoor temperature and humidity conditions were simulated in the steady-state.

At initial setup, a 10cc oil sample was taken from the compressor to serve as a baseline for comparison. The heat pump was instrumented with two pressure transducers—one each at the compressor suction and discharge, and six thermocouples—compressor suction, compressor discharge, outdoor coil inlet, indoor supply air, indoor return air and outdoor exhaust air. Mercury thermometers were used to measure dry-bulb and wet-bulb temperatures in the indoor return and supply air streams. Indoor supply air was routed through a 100 square inch square duct, approximately 6 feet long, which had an averaging pitot tube array attached to its end to measure air velocity. From this measure, air mass flow rate was calculated. With all instrumentation connected the unit was recharged with 10 cc of fresh oil and 40.9 oz of R-22.

Baseline testing was performed at three points by running the heat pump in the steady state and drawing data for approximately 15 minutes. The three test conditions are as follows:

Heating:	OUTDOOR	47°F DB / 43°F WB
	INDOOR	70°F DB / 60°F WB
Cooling #1:	OUTDOOR	80°F DB / <50%RH
	INDOOR	80°F DB / 67°F WB
Cooling #2:	OUTDOOR	95°F DB / <50% RH
	INDOOR	80°F DB / 67°F WB

Baseline capacity and efficiency results are as follows:

Heating:
Capacity: 12,335 Btu/hr
Power draw: 1,308 Watts
COP: 2.77

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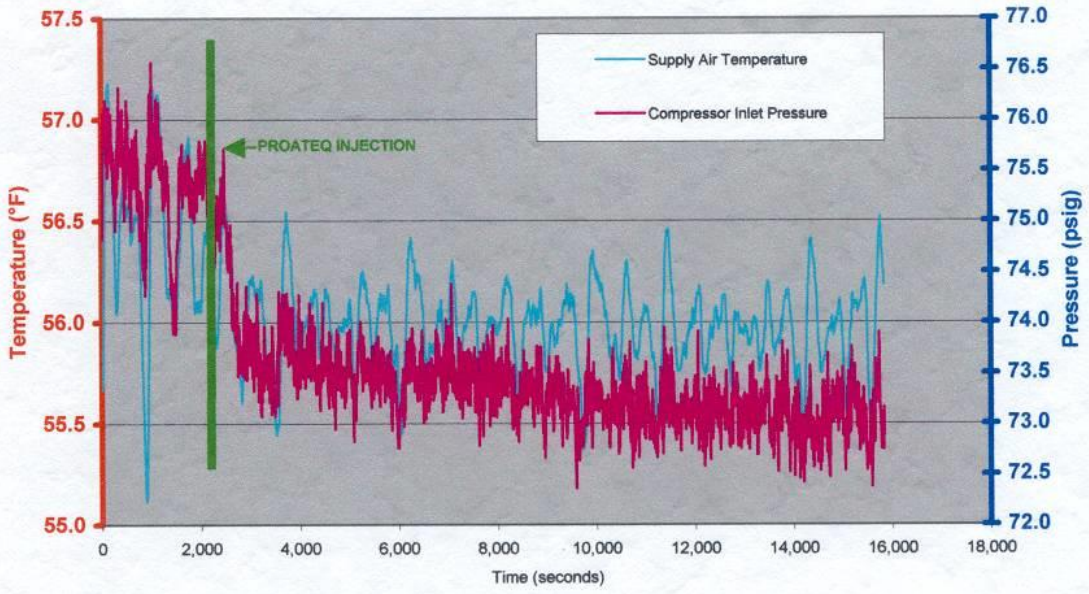
Cooling #1:	Capacity: 14,506 Btu/hr Power draw: 1,288 Watts COP: 3.3 (EER: 11.26)
Cooling #2:	Capacity: 13,833 Btu/hr Power draw: 1,450 Watts COP: 2.79 (EER:9.5)

After baseline testing was completed, the heat pump was run in the cooling mode at condition #1 until the unit was comfortably with in the steady-state, at which point 1.5 oz of Proateq refrigerant oil additive was injected into the suction line service port. Data was collected throughout this process; Figure 1 shows a chart of indoor supply air temperature and compressor suction pressure during ~four hours surrounding the Proateq injection. The green line indicates the time of injection. Over the first 2-3 hours after injection the supply air temperature droped from a pre-injection value of ~56.7°F to as post injection value of ~55.6, a decrease of 1.1°F. There is a measured drop in suction pressure of approximately 1.2 psi, which roughly corresponds to a decrease in evaporator temperature by 1°F.

The decrease in supply air temperature was accompanied by a corresponding decrease in the supply air wet-bulb temperature, and an approximate four percent decrease in compressor power consumption. Cooling capacity increased by approximately four percent, collectively, with the decrease in power consumption, raising the COP by ~eight percent.

Comprehensive testing was not completed in this round of experimentation, but it is continuing on a second test unit. Continuing results will be reported as they are available.

Figure 1--PROATEQ Injection



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Synopsis of Testing for EnSaTEQ Inc.—Unit #2

-as performed at the Thermal Science Research Center
Department of Mechanical Engineering
University of Tennessee, Knoxville

Prepared by: Ron Domitrovic R.D.

Model : Whirlpool
Model #: X24004A0
Serial #: QE2305366
Nominal capacity: 1-ton
Rated cooling capacity: 23,800 Btu/hr
Rated cooling EER: 9.0
Refrigerant charge: 58.5 oz R-22
Manufactured: 05/1995

The above described Whirlpool™ air conditioner was tested at controlled indoor and outdoor air conditoins prior to and after the injection of the Proateq refrigerant oil additive. The unit was installed in a two-room psychrometric testing chamber where indoor and outdoor temperature and humidity conditions were simulated in the steady-state.

At initial setup, a 10cc oil sample was taken from the compressor to serve as a baseline for comparison. The air conditioner was instrumented with two pressure transducers—one each at the compressor suction and discharge, and six thermocouples—compressor suction, compressor discharge, outdoor coil inlet, indoor supply air, indoor return air and outdoor exhaust air. Mercury thermometers were used to measure dry-bulb and wet-bulb temperatures in the indoor return and supply air streams. Indoor supply air was routed through a 100 square inch square duct, approximately 6 feet long, which had an averaging pitot tube array attached to its end to measure air velocity. From this measure, air mass flow rate was calculated. With all instrumentation connected the unit was recharged with 10 cc of fresh oil and 58.5 oz of R-22.

Testing was performed at the indoor and outdoor conditions listed below by running the air conditioner in the steady state and drawing data for approximately 15 minutes.

Cooling #1:	OUTDOOR	95°F DB / 40% RH
	INDOOR	80°F DB / 67°F WB

After baseline testing was completed, the air conditioner was run in the cooling mode until the unit was comfortably with in the steady-state, at which point 2 oz of Proateq refrigerant oil additive was injected into the suction line service port. The unit was then allowed to operate cyclically for approximately seven days to allow the additive ample time to integrate with the system. After the seven days, the unit was retested at the above conditions in the steady-state. Comparative results for baseline and post-injection tests are listed below.

Performance measure		Baseline	After Proateq Injection			
			#1	#2	Average (#1 & #2)	Change vs. BL %
Cooling Capacity	Btu/hr	29,694	33,818	34,028	33,923	14.2
Power Consumption	Watts	2,990	3,053	3,060	3,057	2.2
COP		2.91	3.25	3.26	3.25	11.8
EER		9.93	11.09	11.13	11.11	11.8