Refrigeration

Energyefficient TECHNOLOGIES

Presents

CRYOGEN X4™ THERMAL TRANSFER TECHNOLOGY

Sustainable Scientific Solutions Guaranteed to Improve HVAC/R System Performance

Standard AC Units

Transportation

Ice Machines

Computer Rooms

Chiller Plants

Ammonia Systems

Cell Towers
Communications

TECHNICAL BULLETIN

Independent Laboratory and Engineering Validations –

CryoGenX4 HVAC Performance Enhancement Solutions 3.1, 3.2, 4.1

Over the past 20 years, the Engineering team at TRI-S Technologies has gone to great expense and effort working with the world's leading laboratories and scientific organizations to give our clients the peace of mind by validating that our technology works. Our Gen 3 & 4 technologies have been tested under strict conditions for safety, reliability, and compatibility with all types of HVACR systems, lubricants, seals and refrigerant types under the following industry standards:

AHRI: **Air Conditioning, Heating and Refrigeration Institute**

API: **American Petroleum Institute**

ASTM: **American Society for Testing and Materials**

EPA: **Environmental Protection Agency**

ANSI: **American National Standards Institute**

ASHRAE: **American Society of Heating, Refrigeration and Air-Conditioning Engineers**

We don't make HVAC systems - We make them run better, colder & longer!

Listed on the following pages are backgrounds, excerpts and details from the most prestigious and globally recognized laboratories, corporations and engineering companies around the world that over the last two decades have independently tested the Tri-S Generation 3 and 4 sustainable science and engineering solutions developed to enhance HVAC/R performance.

Constellation (www.constellation.com) is a leading competitive retail supplier of power, natural gas and energy products and services for homes and businesses across the continental United States. Constellation's family of retail businesses serves approximately 2 million residential, public sector and business customers, including three-fourths of the Fortune 100. Baltimore-based Constellation is a subsidiary of Exelon Corporation,the nation's leading competitive energy provider, with 2019 revenues of approximately $34 billion, and more than 31,000 megawatts of owned capacity.

Federal Energy Management Program (www.energy.gov) - The FEMP Program works with its stakeholders to enable federal agencies to meet energy-related goals, identify affordable solutions, facilitate public-private partnerships, and provide energy leadership to the country by identifying and leveraging government best practices. Under the department of energy Federal Energy Management Program, Tri-S Technologies first generation product was tested for efficiency, showing 33% overall improvement in cooling capacity.

Underwriters Laboratories (www.ul.com) is a nonprofit organization dedicated to advancing the UL mission through the discovery and application of scientific knowledge. They conduct rigorous independent research and analyze safety data, convene experts worldwide to address risks, share knowledge through safety education and public outreach initiatives, and develop standards to guide the safe, sustainable commercialization of evolving technologies.

The National Science Foundation (www.nsf.gov) certification programs are accredited to the international standards for third-party product certifiers through the American National Standards Institute (ANSI) and the Standards Council of Canada(SCC), assuring the highest level of integrity, quality, and acceptance throughout the world.

Results

CryoGenX4 added to list of approved Efficiency Made Easy (EMEX) custom energy conservation measures (ECM's) to be funded by on-bill financing since 2009

Lab testing produced average 24% reduction in energy use and an increase of 33% in capacity.

Testing produced a 17.8% increase in capacity, a 17.6% decrease in kW/ton and a 24.6% increase in condensate collected.

Ice making cycle time reducedfrom 20 min to 15 min, equating to a 25% reduction.

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Energy Australia (https://www.energyaustralia.com.au) is an electricity generation, electricity, and gas retailing private company in Australia owned by Hong Kong-based and listed CLP Group. EnergyAustralia also has a portfolio of generating sites using thermal coal, natural gas, hydro-electric, solar energy, and wind power. With extensive performance tests and installations of CryoGenX4, Energy Australia recently started a rollout plan to improve their clients' HVAC systems' efficiency.

ConEdison (www.coned.com) operates one of the world's largest energy delivery systems. Founded in 1823 as the New York Gas Light company, our electric, gas, and steam service now provide energy for the 10 million people who live in New York City and Westchester County. Con Edison reviewed and approved data on TRI-S Technologies' 256 third-party performance results and laboratory tests leading to acceptance into their rebate program for three years before funding was exhausted.

ClimaCheck (https://home.climacheck.com/) is a Swedish-based cleantech company with a unique method for analyzing cooling and heating processes, intending to optimize the functionality and daily operations of heat pumps, refrigeration, and air conditioning systems. The company and their award winning state-of-the-art monitoring system have been conducting independent CryoGenX4 performance tests worldwide for the past seven years.

Texas Oil Tech Laboratories (https://tol-lp.com/) is an ISO/IEC 9001:2015 and ISO 17025 certified petroleum and petrochemical testing laboratory, providing in-house and on-site analytical and testing services. We have in-house and on-site analytical capabilities and develop specific, customized testing packages to meet our clients' individual needs and testing requirements. With proven performance in many industries, we have created unique test procedures to solve complex testing issues.

Oak Ridge National Laboratory (https://www.ornl.gov/) is the largest US DOE science and energy laboratory, conducting applied research to deliver transformative solutions to compelling problems in energy and security. The lab has a diverse set of capabilities spanning a broad range of scientific and engineering disciplines. The FAU certified laboratory in Florida, which is under the direction of PhD and P.E. Fred Bloetscher, was contracted by ORNL to conduct this testing.

Results

Heat pumps tested in a lab produced a 13.3% Reduction in kWh usage while capacity increased by 16.8%

Paid out >$290,000 in rebates over three years before exhausting initial project funding.

Results produced Systems Efficiency Index (SEI) increase of 15-28% & energy reduction of 12-16% in 40+ tests

Validated product compatibility with all refrigerants and oils; increased Lubricity by 4900%; Tested Effective to -70°C

4 Units tested in lab showed 16% decrease in kW/ton; and increased capacity of 16% - consistent with prior in-situ results

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TAFE SA is South Australia's largest Vocational Education and Training (VET) provider and one of the largest in Australia. It is also a registered higher education provider. The Automotive and transport engineering division conducted computerized performance tests on vehicle and transport A/C units proving the efficacy of our technology. Five independent and separate vehicle tests were conducted. TAFESA then treated their entire fleet of 45 college vehicles.

Southern Independent Testing Agency (SITA) (http://www.sita-tab.com/) provides Testing, Adjusting & Balancing (TAB), Building Commissioning, and Building Air Barrier Testing. Based in Tampa, FL, the company provides these services to clients throughout the Southeastern United States. With multiple certifications and qualifications, SITA has provided these HVAC services with high degree of integrity and professionalism for over 25 years with three generations of experience.

Duccio Tempesti Engineering is led by its' namesake, a renown P.E. with a PhD in engineering and several published engineering papers across Europe, UK, and the Middle East. His team conducted comprehensive field testing using CryoGenX4 in cold food applications at the Food Valley Markets in Italy.

Vox Fibre is an Internet service provider that supply a variety of products, like Fibre, LTE, Voice, Hosting, Wireless services to customers and SME all over South Africa. VOX uses The Green Wave Group as their energy partner. GWG is a leading provider of energy management services, specializing in BMS (Building Mgmt Systems), Power metering, Solar Energy and Datacentre monitoring & control equipment.

QTS deployed nationwide portfolio after validations.

QTS is an international data center company who has revolutionized data center capabilities by promoting Internet diversity, enhancing our connectivity ecosystem and by integrating artificial intelligence, machine learning and predictive analytics into their customers' data center operations. Founded in 1983, Gibbens Drake Scott, Inc. (GDS) is a full-service Mechanical, Electrical and Telecommunications engineering design firm supporting QTS in energy monitoring of their 15M sf of data center floorspace.

Results

Avg results on 5 cars tested showed a 6.5% ↓ in overall fuel use and 23% colder supply air temperture at vents

Showed average 23% ↑ in capacity and 26.5% ↑ in COP across 3 large RTU's totaling 65 tons of cooling

Results show inlet refrigerant temp ↓ of 2.3°C equating to a ↓ in energy use of 18%

Measured a 26.3% ↑ in capacity and a 25.6% ↓ energy reduction in 6-yr old water-cooled DX chiller

3,000-ton chiller measured ↑ of 8.9% capacity and 11.6% in COP; a ↓ of 10.2% in energy usage

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CryoGenX4 Approved -Marriott Corporate

Marriott Hotel Corp is the largest hospitality group in the World with over 8,000 properties under 31 different brands. Technical personnel from Marriott directly oversaw and validated savings 2015-2023 across four Marriott properties and resorts in their Miami Airport and Aruba to approve for portfolio deployments. Currently

In partnership with engineers from Underwriters Laboratories, the famous independent testing group, the CBRE Certified Energy Manager witnessed all the measurements of 4 RTUs for a major banking client and then analyzed the savings produced with weather-adjusted power bills. The UL engineers also watched and recorded all the testing measurements following the IPMVP protocols.

Electrolux is a leading global appliance company that has shaped living for the better for more than 100 years. In our certified labs we reinvent taste, care and well-being experiences for millions of people, always striving to be at the forefront of sustainability solutions. The company tested the ECM in brand new efrigerators looking for even the smallest improvements to earn higher Energy Star ratings.

Baltimore Gas & Electric, an Exelon Company, oversaw validations in Baltimore, MD and paid out rebates during the 2010-2013.

Energy Efficient Technologies (EET) was formed in 2007. Our team includes dedicated licensed professional engineers who have spent their 35+ year careers in technology R&D. From creating highly innovative and complex operating systems for efficiency on US NAVY ships and submarines to developing and managing alternative energy methods, our principals possess a wealth of experience.

CryoGenX4 Approved -Omega Healthcare

EET& Nexion Health, part of the Omega Health System, validated the energy savings on their power bills generated by installing CryoGenX4 into 754 HVAC and refrigeration units spread across 60 Assisted Living and Rehabilitation locations in TX,MS, LA

Results

11 years of validations with average 22% Savings. CryoGenX4 Approved for Deployment.

Measured avg of 22% in capacity and 24% in COP; 21% in kW/ton across 4 RTUs

Avg Delta-T of entering & leaving evaporator temps by 47%, from 3.93 to 5.8° - Significant!

Reviewed and paid rebates 2010-2013

Validated savings in over 500 projects in thousands of machines with avg 22% Savings including the projects highlighted below.

Demonstrated Avg Overall Utility Bill Savings of 13.1% yr-over-yr

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Columbia distributing

MillerCoors A MOLSON COORS COMPANY

Columbia Distributing is a proud member of the MillerCoors family of distributors. With currently own and operate 17 distribution facilities spread across the Western coast of the United States, from Medford, Oregon up to the Canadian border and all the way over to Spokane, Washington. We are supported by 1,000+ tons of comfort cooling and refrigeration equipment – all of which has been treated with CryogenX4.

ARMADA There's a better way.

McDonald's

CryoGenX4 Approved -McDonald's System

We are changing the way supply chains are managed - now and for the future - through innovation and collaboration with our clients like McDonald's. We operate millions of sf of temperature-controlled space under roof, and all of that cooling and refrigeration equipment contains CryoGenX4. We are changing for the better how the world eats.

MITCHELL DISTRIBUTING

ANHEUSER-BUSCH

CryoGenX4 Approved -Anheuser-Busch Corporate

Mitchell Distributing now employs around 550 people throughout our four main distribution facilities in Mississippi, from which we proudly supply Anheuser-Busch products to the entire state. To get even more energy efficient, in 2022 we treated all of our nearly 1,000 tons of of cooling and refrigeration plants with CryoGenX4. We remain committed to quality, service and pride in every aspect of our operation.

cogent

CryoGenX4 Approved -Cogent Communication

Cogent owns and operates 114 Data Centers in North America, offering secure, flexible, and scalable Colocation and connectivity solutions. Cogent's primary services consist of Internet access and data transport, offered on a fiber optic, IP data-only network, along with colocation in data centers. Many of our centers now have CryoGenX4 protecting our mission-critical cooling equipment.

CRESCENT CROWN DISTRIBUTING

MillerCoors A MOLSON COORS COMPANY

Crescent Crown Distributing operates 1.1M square feet of MillerCoors beer distribution across five locations in Louisiana and Arizona. CryoGenX4 was deployed in every Machine in the portfolio.

Results

In conjunction with EET, our Energy Manager validated 20.5% in kWh savings yr-over-yr in 2.2M sq ft-14 buildings

Facilities Director and EET validated 22.6% kWh savings at the DX machines and 15% off power bills & Re-tested 3 years later in 2023

Energy Manager and EET validated 55 Machines with 20.9% reduction in kWh on utility bills in the portfolio

EET validated test results in 8 different facilities in 5 different states yielding avg 21.3% kWh savings at the units overall.

EET validated 18.6% portfolio efficiency improvement from CryoGenX4.

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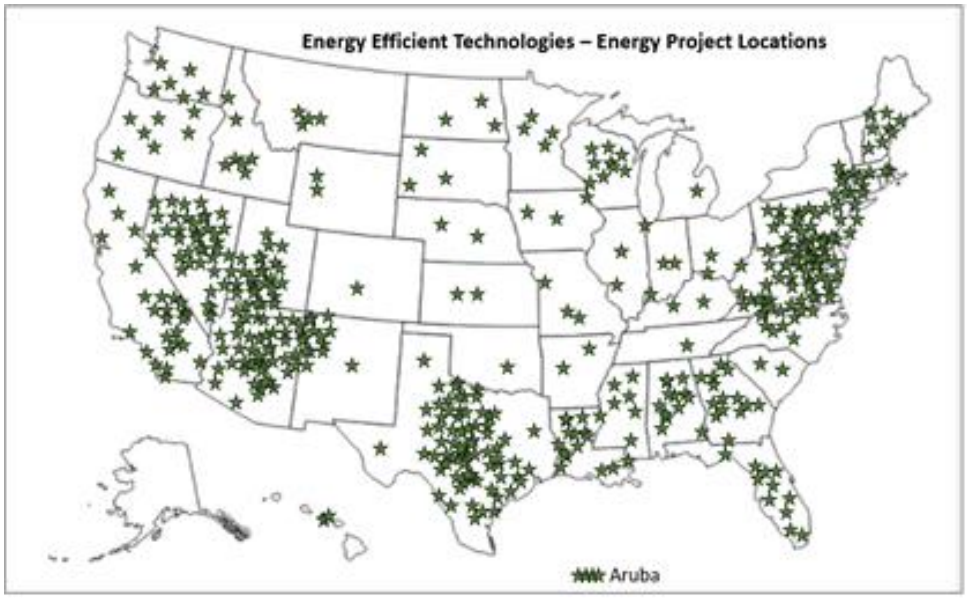
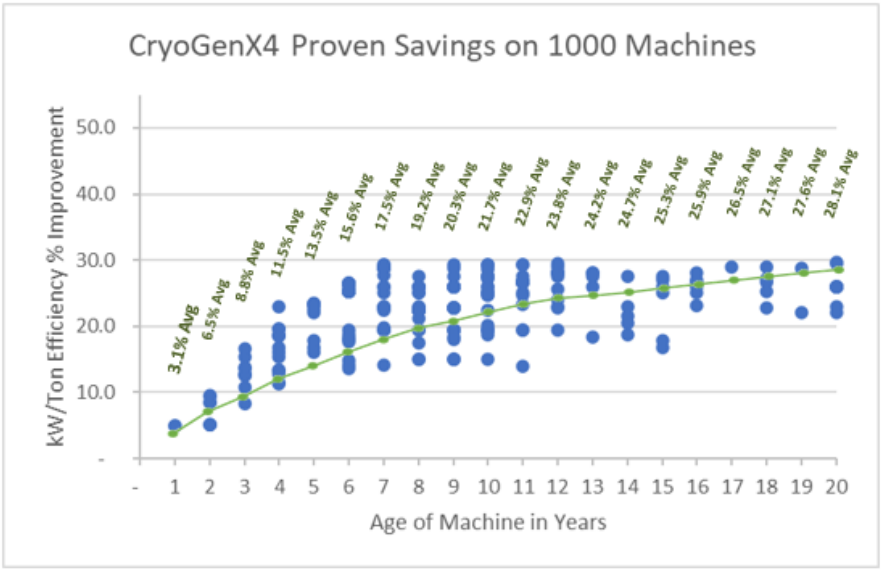
Summary of Energy Efficient Technologies
CryoGenX4 Only Validated Results

Over 2700 Projects in 16 years:





● Validation Results
- Average Savings By Age

Overall Average 22.5%
At the Machines

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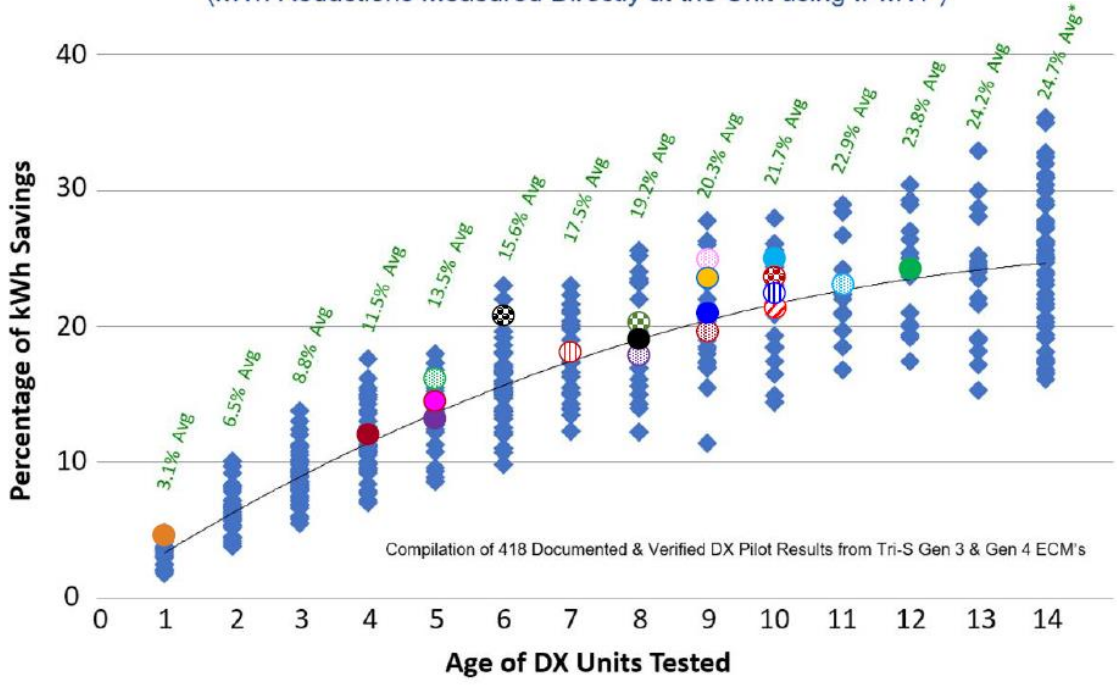
Addendum

The following pages include Summaries and/or Segments from many of the detailed Private, Government and University Laboratory Studies conducted on the Tri-S Technologies ECM products. Also included is:

- **An attestment by the President of Energy Efficient Technologies as to the validity of the data presented in the Technical Bulletin;**
- **A statement from the President of Tri-S Technologies stating that their CryoGenX4 product is marketed as EnviroTemp in Australia;**
- **Other certified 3rd Party Field Testing conducted on the Tri-S ECM Technology over the years – including signatures/names of the key personnel involved in each.**

3rd Party Validation of Historical DX Efficiency Savings

(kWh Reductions Measured Directly at the Unit using IPMVP)



FEMP	1 Refrig Unit	Oak Ridge/FAU	4 Wall Units	Marriott	6 RTUs	Marriott	13 Units
UL Labs	1 RTU	tafeSA	5 Fleet Autos	CBRE/UL Labs	4 RTUs	Columbia Dist/Coors	422 Units
NSF	1 Ice Machine	SITA	3 RTUs	Electrolux	1 Refrig Unit	Armada/McDonald's	121 Units
Energy Australia	4 Heat Pumps	DTE	1 Refrig Unit	EET	200+ Units	Mitchell Dist/A-B	56 Units
ClimaCheck	42 Various Units	VOX/GWG	1 DX Chiller	Nexion Health	340 Units	Cogent	8 CRAC Units

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NOTICE FOR IMMEDIATE RELEASE

Subject: Verifying Tri-S Products

Tri-S Technologies LLC, a Houston, TX-based company, is the inventor and manufacturer of the patented **CryoGenX4** technology as well as the three previous generations of the technology dating back to 1998.

The purpose of this notice is to certify that **CryoGenX4** is the product name we market our technology under in United States and throughout the rest of the world. The exception is Australia. Due to licensing issues in that country, Tri-S Technologies markets our technology there under the name **Envirotemp**. The products are identical in chemical composition, only the labeling is different.

CRYOGEN X4™ THERMAL TRANSFER TECHNOLOGY = EnviroTemp

(United States and most of the World) (Australia Only)

Tony Sgarbi President,

Tri-S Technologies

Tri-S Technologies,
2400 Central Parkway, Suite K, Houston, TX, 77092
www.hvacmiser.com

23 February 2021

To: Potential Users of CryoGenX4

From: Joseph Mearman, P.E.

Subject: Certification of Tri-S Technical Bulletin Information

As both a professional engineer and President of Energy Efficient Technologies (EET), I hereby attest to the integrity and accuracy of the information presented in the current 2021 Tri-S Technologies Technical Bulletin.

My company has conducted or directed more than 300 tests of the Tri-S technologies over the past 15 years, all of which showed improvement in the performance of the cooling systems involved. The vast majority of EET's testing followed the International Performance Measurement and Verification Protocols (IPMVP). The IPMVP is the most widely accepted methodology throughout the worldwide scientific community, including the US Department of Energy, for testing performance of cooling systems in the field. Additional testing was performed using utility grade meters on isolated HVAC/R power panels measuring 96 attributes of electricy usage. By reviewing this data on days with similar building load and near identical exterior conditions, savings are easily identified at the units and then verified on the actual utility bills.

I have also reviewed all the laboratory and organizational testing put forth by Tri-S, as well as the summary results listed in the technical bulletin. Without question, all the information presented is accurate.

P.E. License Number: MD PE License number 22718

P.E. Printed Full Name: Joseph F. Mearman, Jr.

Signature:

Company: Energy Efficient Technologies, LLC

Title: President

Place P.E. Stamp in Area Above

Energy Efficient Technologies,
403 Headquarters Drive, Suite 5, Millersville, MD 21108
www.eSquaredT.com

Electrolux New Equipment Testing Results

Since it was pulled right off the Electrolux assembly line, the improvement in thermal efficiency in the Side-by-Side refrigeration unit was solely attributable to the Tri-S ECM. This improvement in efficiency in brand-new equipment appears to be the result of the successful removal of the newly accumulated lubricant excess layer on heat exchange surfaces that only formed during the week-long break-in period. There is also evidence from the data collected that the ECM does appear to increase heat transfer through the tube walls by enhancing the thermal conductive properties of the copper and aluminum of which they are made since everything else was constant baseline and post.

Following installation of the Tri-S ECM into the suction side of the refrigeration circuit, the three successive cooling cycles measured immediately following a defrost cycle showed an average Delta-T of 5.8°F between the entering evaporator and leaving evaporator temperatures. ***This increase in Delta-T of 1.83°F over the baseline average of 3.93°F represents an increase of 47.6%. This is considered very significant.***

In achieving the Delta-T improvement, the ECM produced a colder entering evaporator temperature. Prior to treatment, the coldest average entering evaporator temperature was -20.06°F. Following treatment, the coldest average evaporator temperature dropped to -21°F. ***This .94° drop equates to a 4.7% improvement. This is also considered significant.***

Corresponding to the colder entering evaporator temperature, the Tri-S ECM also generated a warmer leaving evaporator temperature. Prior to treatment, the warmest average evaporator temperature was -16.13°F. Following treatment, the warmest average leaving evaporator temperature rose to -15.2°F. ***This .97°F rise equates to a 6% improvement. This result is again considered significant.***

Testing Lead

Kevin Cobb, Measurement & Test Engineer, Electrolux Testing Facility, Anderson, SC

Testing Certification

The data collection, methodology and findings conducted by Electrolux are accurate.

Signature _____

Title: Compressor Test Engineer, Electrolux Home Products North America

Date 27 - Jan - 14

UL LLC
801 Klein Road, Suite 200, Plano, TX 75074
Laboratory Data Package

TEST LOCATION :			
UL LLC 801 Klein Road, Suite 200, Plano, TX 75074			
CLIENT INFORMATION			
Company Name:		Tri-S Technologies	
Address:		2400 Central Parkway, Suite K Houston, TX 77092	
Project Number:	4786820856	Date:	4/7/2015
Sample Number:	2030380-NW		
AUDIT INFORMATION:			
Description of Tests Per Standard No. and edition and/or revision date		ANSI/AHRI Standard 340/360-2007 with Addenda 1 and 2 ANSI ASHRAE Standard 37-2009	
Tests Conducted by:		Samuel Holliverse Ricky Chang	*Samuel Holliverse* *Ricky Chang*
		Printed Name	Signature
Reviewed and accepted by Responsible Engineer		Brijesh Darji	*Brijesh Darji*
		Printed Name	Signature

Purpose of Study

The purpose of this study is twofold. First, to verify the current capacity and efficiency of a seven- year-old packaged roof top unit (RTU) in relation to original equipment manufacturer (OEM) design specifications. Second, to demonstrate what, if any, material changes occur in this same unit after being treated with the Refrigerant Additive by Tri-S Technologies, heretofore referred to as the ECM (Energy Control Measure).

Test Unit: 2008 Trane, 7.5 Ton, R-22, 208/230 Volt-3 Phase, Model TSC090A3EGAZUB

Summary Results

The conditions for the AHRI 100% "A" test included standard with ambient environmental conditions at 95 degrees F dry bulb and 75 degrees F wet bulb and entering evaporator coil air temperature at 80 degrees F dry bulb and 67 degrees F wet bulb at 400 CFM per ton @ design static pressure.

Trane 7.5 Ton	Design	Actual (before ECM)	Actual (after ECM)	% Difference
Btuh	90,000	64,796	76,340	↑ 17.8%
kW	8.74	9.97	9.68	↓ 2.9%
Tons	7.5	5.40	6.36	↑ 17.8%
EER	10.3	6.50	7.89	↑ 21.4%
kW/Ton	1.165	1.846	1.522	↓ 17.6%
Condensate	--	5.45 lbs	6.79 lbs	↑ 24.6%

Client: Tri-S Technologies, LLC

The in-situ testing of the Tri-S Energy Control Measure in two unitary systems occurred at two locations in Brooklyn, NY. The addresses are 987 4th Avenue & 9904 4th Avenue. The instrumentation utilized during the baseline and the post data gathering period were identical. The methods to employ these instruments were identical as well. Current instrument validation of calibration and accuracy were furnished to Underwriters Laboratories (UL) to assure compliance with accepted standards.

On August 10, 2015 during the baseline measurements, UL's Senior Field Engineer Jeffery Martin witnessed and verified all readings performed by the Tri-S engineering team. On September 3, 2015 the team returned to these same two locations and performed the post measurements with UL's Engineering technician Paul Gagliardi verifying all data collection.

After all data was received, field data sheets were completed by requesting the data that was sent to the mobile devices of the UL representatives to be read aloud to the field engineer performing the test and that the data read from their devices was transferred in writing to the field sheet. The UL representatives were asked to sign and date these sheets and a photograph the results.

The following categories were measured and witnessed by the UL representatives:

- System air volume (CFM)
- Return and supply air dry and wet bulb temperature (measured across the fin and tube evaporator)
- Total equipment voltage and amperage (measured at the service disconnect switch)
- Refrigerant suction, discharge pressures, superheat and sub-cooling
- Dry bulb temperature of outdoor air entering the fin and tube condenser coil

This method of testing and extensive data tracking and validation completes the testing protocols and adherence to the field AHRI 340/360 standard strategy.

Paul Gagliardi

Date: 9-28-2015
Engineering Technician
Project Handler-CLS
3027C
Underwriters Laboratories LLC.
1285 Walt Whitman Rd.
Melville, N.Y. 11747
(631) 546-2354 Ext. 22354
Paul.Gagliardi@ul.com

Jeffrey Martin

Date: 10/6/2015
Global HVAC Program Manager
Underwriters Laboratories LLC.
1285 Walt Whitman Rd.
Melville, N.Y. 11747
(607) 642-5408
(607) 239-8367
Jeffrey.Martin@UL.com

Summary of HVAC/R Efficiency Study Results at COSTCO (across all 3 units)

ASSOCIATED AIR BALANCE COUNCIL CERTIFICATION

AABC

PROJECT COSTCO
CLEARWATER MALL

ADDRESS 2655 GULF TO BAY BLVD.
CLEARWATER, FLORIDA 33759

The data presented in this report is a record of system measurements and final adjustments that have been obtained in accordance with the current edition of the AABC procedural standards for *testing, adjusting and balancing of environmental systems* and per the project specifications. Any variances from design quantities, which exceed AABC tolerances, are noted in the test report project summary.

THE DATA CONTAINED WITHIN THIS REPORT IS TRUTHFUL AND REFLECTS THE OPTIMUM PERFORMANCE CAPABILITIES OF THE INSTALLED SYSTEMS.

SUBMITTED AND CERTIFIED BY THIS AABC AGENCY
SITA - SOUTHERN INDEPENDENT TESTING AGENCY, INC.
140A Whitaker Road, Lutz, FL 33549

TEST & BALANCE ENGINEER
BRIAN C. KAUPP

PROJECT / CERTIFICATION NUMBER
7664

TBE REGISTRATION NUMBER
03-09-36

DATE OF CERTIFICATION
May 12, 2014
REVISED JULY 9, 2014

Southern Independent Testing Agency, Inc. • ASSOCIATED AIR BALANCE COUNCIL • AABC • TBE • 03-09-36 • Brian C. Kaupp

[SEAL] [SIGNATURE]

Costco has the problem of thermal degradation in its HVAC/R units. The low operating tonnage & COP ratings measured in-situ are in line with the ASHRAE loss of performance and cost to operate numbers. Baseline measurements show the equipment is using significantly more kWh to operate than when new. The efficiency summary includes all HVAC units measured, combining the current efficiency & tonnage of all units. This summary sampling is the cumulative impact of thermal degradation on the portfolio.

The implementation of the Tri-S ECM resulted in a restoration of 11.7 operating tons, equating to a 23% increase in capacity. Combine this with an average improvement of 26.5% in Coefficient of Performance (COP) and the cost to operate the equipment going forward is significantly reduced.

THE TOXICOLOGY GROUP, LLC

A Wholly Owned Company of NSF International

Evaluation Of "TRI-S HVAC Enhancement Product" on the Performance of a Commercial Ice Machine

RESULTS

Test details – An ice cuber model Manitowoc GR0150A was tested before and after the introduction of 1 oz of the Tri-S product. This machine continuously circulates water over a cooled ice trough. When the ice reaches a certain adjustable point it completes a circuit that triggers the reverse hot cycle that heats the ice trough. The ice then slides off the trough and into the bin. By doing so the ice actuates a baffle connnected to a switch that signals the compressor to resume the cooling cycle. For this test the ice production time was measured and it was triggered off this switch. The energy consumption was monitored on the incoming power supply to the entire unit. Both prior to and after the introduction of the Tri-S product, the ice bin was completely empty so that the cycle times were run under the same conditions.

The ice cycle time decreased from 20 minutes down to 15 minutes, with a portion (approximately 2 minutes) of this time being attributed to a cooler bin due to ice presence. A 25% reduction in ice production time was attributed to the Tri-S HVAC Enhancement product itself. The energy consumption also decreased by approximately 6% after the addition of the product which is highly significant.

Quality Assurance Statement:

This document was prepared and reviewed by qualified scientists was specifically reviewed for data consistency and quality. Documents of this type are not required to meet Good Laboratory Practice Standards as established by the U.S. Environmental Protection Agency (40 CFR, Part 160) and OECD.

Tested by: Sal Aridi

Lead Engineer Date: October 1, 2009

QA Reviewer: Kevin Dosert

Senior Specialist Engineering Laboratory Date: Oct. 1, 2009

Report Prepared By: Maryann Sanders

Senior Scientist – The Toxicology Group, LLC Date: 10/1/09

Certificate of Analysis

SINCE 1985
Quality Controlled Through Analysis

10630 Fallstone Rd, Houston, Texas 77099
PO Box 741905, Houston, Texas, 77274
TEL: (281) 495-2400
FAX: (281) 495-2410

Client:	Tri-S Technologies	Requested By:	Mr. Tony Sgarbi
Sample:	10% Performance ECM + 90% Refrigeration Oil	Report Date:	April 18, 2011
Laboratory	19695-02 Page 1 of 2	Purchase Order No:	Pending

TEST	RESULTS
Compatibility with Chlorofluoro Hydrocarbons (Group I Refrigerant)	Compatible (No separation)
Compatibility with R-40, R-717, R-764 (Group II Refrigerant)	Compatible (No separation)
Compatibility with R-290 Propane (Group III Refrigerant)	Compatible (No separation)
Compatibility with Mineral Oils	Compatibility with
Compatibility with Synthetic Oils	Compatibility with
Seal Compatibility Index, 24hr @100°C, IP-278	5
Total Organic Halogens (TOX), EPA 9020B, ppm	364

TEST	RESULTS
Aniline Point, ASTM D 611, °F	11
Dielectric Breakdown Voltage, ASTM D877, Kv	41
Flash Point, PMCC Closed Cup, ASTM D 93, °F	370
Water Content by Karl Fisher, ASTM D 1744, ppm	10
Viscosity, Kinematics @40°C, ASTM D 445, cSt	7.8
Pour Point, ASTM D 97, °F	-70
pH by Glass Electrode, ASTM D 1287	6.18
ASTM Color, ASTM D 1500	<0.5
Specific Gravity, @ 15/15 °C, ASTM D 70	0.9200

Above tests were performed according to *ASHRAE* Methods

Thermal Conductivity of Petroleum Products ASTM D 2717:

TEST	RESULTS
Thermal Conductivity @ 90 °F, Btu.in/hr.ft^2 °F (Refrigeration Oil Only)	0.94
Thermal Conductivity @ 90 °F, Btu.in/hr.ft^2 °F (10% PIX Additive + 90% Refrigerant Oil)	1.18

Prepared By,
Nader M. Sorurbakhsh, P.E. Laboratory Director

COLLEGE OF ENGINEERING & COMPUTER SCIENCE
Department of Civil, Environmental and Geomatics Engineering

Purpose

Under contract with Oak Ridge National Laboratories and in close coordination with Florida Power & Light Juno Beach Labs, FAU College on Engineering conducted detailed research and testing on the Tri-S Technologies Energy Conservation Method that claims to restore the thermal degradation that occurs in all HVAC/R equipment.

Testing Director

Frederick Bloetscher, Ph.D., P.E.

Methodology

The International Performance Measurement and Verification Protocol (IPMVP) is the widely referenced framework for "measuring" energy savings at each site. IPMVP presents common terminology and defines full disclosure, to support rational discussion of measurement and verification issues. A primary purpose of IPMVP is to publish current good measurement and verification practice, as reassurance for the public about savings reports. Performance contracting industry growth in the USA was facilitated by the publication of the IPMVP.

The Association of Energy Engineers (AEE), American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE), and The Efficiency Valuation Organization (EVO) recognize the IPMVP as a global methodology for determining the effectiveness of energy conservation methods and products. There are four distinct options in the IPMVP protocol for energy conservation professionals to utilize: options A, B, C and D. Retrofit Isolation (Option B) was the option used for this report. Option B is defined as: All parameter measurements with the boundary of the ECM (**Tri-S Technologies Product**) as the single source of measurement.

Results from Controlled Lab Site

- Voltage relatively constant
- Amperage dropped average of 6% in the four units after ECM is added
- Air flow was constant
- Coil Capacity increased an average of 16% in each system treated with ECM
- Enthalpy delta improved an average of 16% in the four standard HVAC systems
- Watts per ton decreased in the four units HVAC systems by an average of 16%
- EER delta improved by 18%
- Efficiency improved by 16%

While the four test units were tested in July - September, the question is how the Florida lab examples compare to the other 16 in-situ examples submitted by Tri-S, which included installations in Florida, Michigan, Maryland, New York and Connecticut. The findings are that similar results were reported with both test conditions despite the differences in location. In all cases efficiency of the units was improved and for most parameters the results were similar. Where they differed, the age and size of the in-situ systems suggest greater improvements in performance.

Setting the Stage

This is an evaluation report on the performance levels of a light commercial Panasonic (16.0 Kw Capacity in Heating Mode) HVAC system treated with the refrigeration performance enhancement product known in Australia as EnviroTemp (the product is called CryoGenX4 in the United States and the rest of the world).

Participants

Mr. Rob Werry, ClimaCheck Analysis Consultant, June 19, 2019
Mr. Ronnie Hall, Energy Australia, Melbourne, Victoria
Mr. Enrico Sgarbi, Director of EnviroTemp - Asia Pacific
Mr. D. Leonard, Owner/HVAC Engineer, Comfy First HVAC Services

EnviroTemp

EnviroTemp is an energy performance enhancing solution that is specifically designed to overcome refrigerant-side efficiency losses attributed to the effects of thermal degradation within the condensing and evaporating circuits of oil-based refrigeration units.

ClimaCheck Performance Analyzer

The ClimaCheck analyzer is a specialized data collection instrument specifically developed to conduct evaluations of the operating performance levels in the field within refrigeration, air conditioning and heat pump systems.

Information collected includes the following: Efficiency Ratings, Overall Heat Exchange Abilities, Compressor, Heating Capacity, Power Input, plus refrigeration temperatures throughout the system.

Sensors were attached to the compressor to measure the high and low operating pressures. Electrical probes were attached to the compressors main power control board to measure voltage, amperage and power factor efficiency. All sensors and probes were connected by Comfy First's HVAC Manager.

Analysis Results

The results noted below are based upon the mean average operational performance data whilst the air conditioning system was operating under load and using a similar amount of Input Power (Kw) as collected by the ClimaCheck system.

Item	Pretest	Post Test 1	Post Test 2	Outcome Percentage
SEI Heat	33.1%	34.6%	35.7%	+7.9%
Heating Capacity (Kw)	16.6 Kw	18.0 Kw	18.8 Kw	+13.3%
COP Heating	3.95	4.17	4.39	+11.1%
Power Input (Kw)	4.2 Kw	4.3 Kw	4.3Kw	+2.5%
Return Air Temperature	22.6 Deg	25.5 Deg	26.4 Deg	+16.8%

FEDERAL TECHNOLOGY ALERTS

Federal Energy Management Program (FEMP)

Polarized Refrigerant Oil Additive

Produced for the U.S. Department of Energy by the Pacific Northwest National Laboratory

Technology for Improving Compressor and Heat Exchanger Efficiency

Abstract

Polarized refrigerant oil additives (PROA) save energy and equipment by increasing the efficiency of heat exchange systems and reducing equipment wear. The technology was specially developed for air conditioning and refrigeration systems. Once installed, it forms a boundary film on metal parts and provides lubrication while protecting parts from friction degradation while also stabilizing the metal to increase its heat transfer ability. In our testing scenario, the PROA used to treat the system is known by the brand name PolarShield which is manufactured by Tri-S Technologies in Houston, TX.

History of the Technology

The PROA technology was developed as a result of 20 years of work and 10 years of testing by three scientists. In 1990, a U.S. patent was awarded to Charles Wilkins, Jack Hammack, and Charles Thompson (Patent 4,963,280). The patent was subsequently perfected and then manufactured and sold under the Polar Shield PROA name by Tony Sgarbi, CEO of Tri-S Technologies in the late 1990's.

Application Domain

The PROA technology can be safely used to treat air-conditioners, heat pumps, refrigeration units, and freezing equipment in the private and Federal sector. It can be used to treat screw-type compressors, hermetically and semi-hermetically sealed positive displacement (reciprocating) compressors, scroll compressors, and centrifugal chillers. It is not applicable to absorption chillers.

Application Domain

The product was tested at Oak Ridge National Laboratory (ORNL) in a controlled laboratory environment. A 15-year-old air-to-air heat pump was removed from the field and placed in a test chamber regulated to a constant 95°F (35°C) per ARI test standards. The compressor was treated with the PROA and run in a steady-state condition (no cycling) for 9 days.

Verification of Energy Savings

After treating a system with the PROA, it should be allowed to stabilize the metal throughout the system. After about 2 weeks, repeat the baseline monitoring procedure to determine post-treatment energy use. The system in our case study was monitored for four more 3-week periods to see whether efficiency continued to increase. During the last 3-week period, period 5, the system used 878 kWh and had a maximum demand of 3.25 kW. A comparison of periods 1 and 5 indicated that energy consumption was reduced 277 kWh or 24.0% and peak demand was reduced 0.09 kW or 2.7%.

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