

**Underwriters Laboratories
EnviroTemp**

May 2015

Underwriters Laboratories, Inc.
801 Klein Rd. Suite 200
Plano, Texas 75074
Testing Laboratory TL-339

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:		EnviroTemp	
Address:		PO Box 325, Lobethal South Australia 5241	
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	<i>Samuel Holliverse</i> <i>Ricky Chang</i>	
	Printed Name	Signature	
Reviewed and accepted by Responsible Engineer	Brijesh Darji	<i>Brijesh Darji</i>	
	Printed Name	Signature	
Type of Air Conditioning Equipment (Pulldown menu - Click on Box beside AC/HP Type and select Type)			
	AC Type	None	AC Type
TESTS TO BE CONDUCTED			
Test No	Done	Test Name	Comments/Parameters
1	X	ANSI/AHRI Standard 340/360 -2007 with Addenda 1 and 2 ANSI ASHRAE Standard 37 - 2009	
2			
3			
4			
Description of Sample/s		7.5Ton Package Unit	
Package System Model No.		Trane TSC090A3EGAZUB	
Nameplate V, Ph, HZ, A		208~230 V/ 3Ph/ 60 Hz	
Condenser Type		[X] Air-Cooled [] Water cooled [] Evaporatively-cooled	
Compressor Type		[X] Hermetic [] Semi-Hermetic [] Motor-Driven	
Indoor Section		[] With [X] Without Electric heat	

56-LO-F0406 Issue: 2.0

UL LLC
801 Klein Road, Suite 200
Plano, Tx 75074

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 EnviroTemp.

The identification of test unit is recorded as follows:

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

Preparation of the Unit for Testing

EnviroTemp delivered the test sample equipment to the UL test lab located at 801 Klein Rd. Suite 200, Plano, Texas.

UL unloaded and uncrated the test sample equipment and recorded all nameplate information, compressors, condenser fan motors, and the type and size of the evaporator and condenser coils.

UL witnessed and/or took part in the preparation of the units in the staging area by the mechanical contractor, Lane Valente Refrigeration (LVR) before separately taking the unit into the test chamber. This included the following:

- all heating elements and economizers being removed so as not to affect the test data (LVR)
- refrigerant being recovered into its own vessel (LVR)
- refrigerant being tested for acid content (LVR)
- core driers being replaced to reduce the chance of creating a restriction during testing (LVR)
- vacuum being pulled on the system down to 500 microns for 30 minutes (LVR)
- reclaimed refrigerant being reinstalled per nameplate (LVR)
- external coils being inspected for cleanliness (LVR)
- particulate return air filters being removed during the test (LVR)

Testing Procedures

After complete mechanical servicing and preparations, the test sample was installed inside the AHRI certified dual psychometric environmental test chamber. Next, the indoor and outdoor ductwork was built according to ASHRAE 37-2009 and installed on the test sample. Transducers were then installed on the refrigerant lines to measure refrigerant pressures. Thermocouples were installed to provide refrigerant line temperatures for the purpose of calculating superheat. Airflow was measured and verified within 5% of a rate of 400 CFM per ton. The measurement methodology for air-flow included utilizing a NIST certified hot wire anemometer as defined per ASHRAE 37-2009 section

7.7, under the modified air flow measurement protocol and utilizing the air flow calculation stated in section 7.7.4 for standard air.

The test sample was evaluated under the AHRI 340/360-2007 “Performance Rating of Commercial and Industrial Unitary Air-Conditioning & Heat Pump Equipment” test standard for performance and efficiency covering equipment ranging from 65,000 to 300,000 BTU’S.

All electrical data was recorded using utility grade power meters during the three 10 minute test sessions. This same data is supplied with test results for each category.

As previously stated, the test sample unit was set up and tested to provide a baseline when subjected to “Standard rating Test Conditions” according to AHRI 340/360 2007. The unit was operated at full load test conditions per the standard to provide a 100% “A” test sequence. There were three 10-minute collection time segments at each of the test points (30-minutes total) and then all data was averaged.

The key performance test points for the 7.5-ton sample were as follows:

- Voltage and Amperage
- EER
- Entering evaporator air volume
- Dry and wet bulb temperatures
- Refrigerant pressures and temperatures
- Condensate capture

Summary Results

Below is the resulting data recorded during the testing periods on the test unit under the previously identified AHRI standards. The conditions for the 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 ET)	Actual (after ET)	% Difference
Btuh	90,000	64,796	77,060	18.9%
kW	8.74	9.97	9.68	2.9%
Tons	7.5	5.40	6.42	18.9%
EER	10.3	6.50	7.96	22.5%
kW/Ton	1.165	1.846	1.510	18.2%
Condensate	--	5.45 lbs	6.79 lbs	24.6%

Recorded Test Data

Trane 7.5 Ton (2008)

BASELINE

General Information

Date	7:56 PM 04/07/2015
Start - End Time	7:56 PM 04/07/2015 - 8:26 PM 04/07/2015
Run Number	Run 001
Manufacturer	Trane
Model No.	TSC090A3EGA2UB
Serial No.	843102182L
Sample No.	2030380-NW
UL personnel	RTC
Barometric Pressure	29.26 in Hg
Voltage Description	208-230V / 3Ph / 60Hz
Comments	EnviroTemp A Test / 100% IEER - 80/67-95 30 Minute Condensate Collection = 5.45 lbs. Charge - 9.80 lbs. R-22

Room Conditions

	10:00	10:00	10:00	30:00:00	
Indoor	Sample 1	Sample 2	Sample 3	Average	Units
Average Indoor Inlet Drybulb	79.99	79.97	79.99	79.98	°F
Average Indoor Inlet Wetbulb	67.00	67.01	67.02	67.01	°F
Average Indoor Outlet Drybulb	62.75	62.74	62.73	62.74	°F
Average Indoor Outlet Wetbulb	60.34	60.34	60.34	60.34	°F
Average Indoor Nozzle Drybulb	65.13	65.12	65.11	65.12	°F
ID Humidity Ratio at Inlet	0.01	0.01	0.01	0.01	W
Humidity Ratio at Outlet	0.01	0.01	0.01	0.01	W
Humidity Ratio at Nozzle	0.01	0.01	0.01	0.01	W
Enthalpy at Inlet	31.88	31.89	31.89	31.89	Btu/lbm
Enthalpy at Outlet	26.96	26.97	26.96	26.96	Btu/lbm
Specific Volume V'n	13.60	13.60	13.60	13.60	V`n
Unit Air Flow	3000.81	3000.80	2999.67	3000.43	CFM
Calc Capacity	64350.14	64470.64	64517.29	64445.78	BTU/Hr
Calc Sensible Cap	55561.47	55524.29	55630.65	55572.00	BTU/Hr
Calc Latent Cap	8788.67	8946.36	8886.64	8873.78	BTU/Hr
Duct Loss	350.35	350.07	350.86	350.42	BTU/Hr
Total Capacity	64700.49	64820.71	64868.15	64796.21	BTU/Hr
Average Watts of Test Unit (TOTAL)	9987.25	9961.26	9952.41	9967.03	Watts
EER	6.48	6.51	6.52	6.50	BTUs/Watt

Outdoor

Average Outdoor Inlet Drybulb	95.03	95.00	95.00	95.01	°F
Average Outdoor Inlet Wetbulb	75.01	74.98	75.00	75.00	°F

Refrigerant Pressures/Temperatures

C1 Discharge PSIG	316.01	315.68	315.67	315.79	PSIG
C1 Discharge Temp	134.80	134.60	134.60	134.66	°F
C1 Suction PSIG	79.42	79.38	79.36	79.39	PSIG
C1 Suction Temp	47.00	47.00	47.00	47.00	°F
SuperHeat	12.74	13.07	13.17	13.00	°F

Other Measurements

ID Ent Air 1	79.58	79.56	79.56	79.57	°F
ID Ent Air 2	79.61	79.58	79.62	79.60	°F
ID Ent Air 3	79.38	79.34	79.37	79.36	°F
ID Ent Air 4	79.30	79.23	79.30	79.28	°F
ID Ent Air 5	79.99	80.04	80.05	80.03	°F
ID Ent Air 6	79.75	79.76	79.77	79.76	°F
ID Ent Air 7	79.74	79.72	79.73	79.73	°F
ID Ent Air 8	79.62	79.67	79.66	79.65	°F
OD Ent Air 1	94.52	94.53	94.60	94.55	°F
OD Ent Air 2	94.89	94.86	94.95	94.90	°F
OD Ent Air 3	95.78	95.78	95.79	95.79	°F
OD Ent Air 4	94.06	94.11	94.16	94.11	°F
OD Ent Air 5	94.22	94.24	94.29	94.25	°F
OD Ent Air 6	96.19	96.17	96.20	96.19	°F
OD Ent Air 7	95.29	95.33	95.35	95.32	°F
OD Ent Air 8	94.30	94.30	94.35	94.32	°F
OD Ent Air 9	94.50	94.54	94.59	94.54	°F
OD Ent Air 10	94.84	94.89	94.91	94.88	°F
OD Ent Air 11	96.33	96.32	96.34	96.33	°F
OD Ent Air 12	94.35	94.39	94.43	94.39	°F
OD Ent Air 13	94.92	94.93	94.99	94.95	°F
OD Ent Air 14	94.14	94.21	94.22	94.19	°F
OD Ent Air 15	95.99	95.99	96.00	95.99	°F

Power Measurements

VOLT ab	208.09	208.18	208.31	208.19	Volts
VOLT bc	208.42	208.50	208.61	208.51	Volts
VOLT ca	208.22	208.29	208.41	208.30	Volts
AMPS a	31.42	31.35	31.32	31.37	Amps
AMPS b	30.45	30.37	30.34	30.38	Amps
AMPS c	31.82	31.73	31.69	31.75	Amps
WATTS Total	9987.25	9961.26	9952.41	9967.03	Watts

Hertz 60.06 60.06 60.07 60.06 Hz

Lbs Condensate / 30 Min	Latent Capacity	Sensible Capacity	Calculated Condensate Capacity	Net Capacity	Balance
5.45	11564.90	55572.00	67136.90	64796.21	-3.486451168

Recorded Test Data

Trane 7.5 Ton (2008)

POST

General Information

Date 5/6/15
 Start - End Time 17:17:30
 Run Number **Run 005**
 Manufacturer Trane
 Model No. TSW090A3EGA2UB
 Serial No. 843102182L
 Sample No. 2030380-NW
 UL personnel Ricky Chang
 Barometric Pressure 29.297 in Hg
 Voltage Description 208-230V / 3Ph / 60Hz
 Comments **EnviroTemp Added**
A Test / 100% IEER - 80/67-95
30 Minute Condensate Collection = 6.79 lbs.
Charge - 9.80 lbs. R-22

Room Conditions

	10:00	10:00	10:00	30:00:00	
Indoor	Sample 1	Sample 2	Sample 3	Average	Units
Average Indoor Inlet Drybulb	79.96	79.96	79.93	79.95	°F
Average Indoor Inlet Wetbulb	66.92	66.98	66.94	66.95	°F
Average Indoor Outlet Drybulb	62.31	62.38	62.35	62.35	°F
Average Indoor Outlet Wetbulb	59.37	59.47	59.42	59.42	°F
Average Indoor Nozzle Drybulb	62.73	62.71	62.70	62.71	°F
ID Humidity Ratio at Inlet	0.01149	0.01153	0.01151	0.01151	W
Humidity Ratio at Outlet	0.01038	0.01042	0.01040	0.01040	W
Humidity Ratio at Nozzle	0.01038	0.01042	0.01040	0.01040	W
Enthalpy at Inlet	31.786	31.838	31.809	31.811	Btu/lb
Enthalpy at Outlet	26.25	26.315	26.287	26.284	Btu/lb

Specific Volume V'n	13.645	13.649	13.6497	13.6479	V'n
Unit Air Flow	3084.19	3084.19	3084.19	3084.19	CFM
Calc Capacity	76833.34	76652.91	76639.04	76708.43	BTU/Hr
Calc Sensible Cap	58790.83	58557.67	58557.67	58635.39	BTU/Hr
Calc Latent Cap	18042.51	18095.24	18081.37	18073.04	BTU/Hr
Duct Loss	352.9	351.5	351.6	352	BTU/Hr
Total Capacity	77186.24	77004.41	76990.64	77060.43	BTU/Hr
Average Watts of Test Unit (TOTAL)	9667.8	9685.7	9681.1	9678.2	W
EER	7.98	7.95	7.95	7.96	BTU/Hr·W

Outdoor

Average Outdoor Inlet Drybulb	95.00	95.01	94.99	95.00	°F
Average Outdoor Inlet Wetbulb	74.98	75.01	74.99	74.99	°F

Refrigerant Pressures/Temperatures

C1 Discharge PSIG	304.36	304.93	304.82	304.70	PSIG
C1 Discharge Temp	133.20	133.40	133.40	133.33	°F
C1 Suction PSIG	69.11	69.11	69.10	69.11	PSIG
C1 Suction Temp	40.30	40.30	40.30	40.30	°F
SuperHeat	12.67	13.89	13.44	13.33	°F

Other Measurements

Nozzle Temp	62.73	62.71	62.7	62.71	°F
ID Ent TC 1	80.78	80.69	80.78	80.75	°F
ID Ent TC 2	80.81	80.78	80.81	80.8	°F
ID Ent TC 3	80.71	80.6	80.69	80.67	°F
ID Ent TC 4	80.47	80.31	80.42	80.4	°F
ID Ent TC 5	80.61	80.39	80.54	80.52	°F
OD Ent TC 1	95.32	95.27	95.21	95.27	°F
OD Ent TC 2	94.5	94.36	94.43	94.43	°F
OD Ent TC 3	95.96	95.74	95.82	95.84	°F
OD Ent TC 4	94.76	94.58	94.74	94.69	°F
OD Ent TC 5	93.54	93.23	93.43	93.4	°F
OD Ent TC 6	95.43	95.22	95.18	95.28	°F
OD Ent TC 7	94.92	94.67	94.73	94.77	°F

Power Measurements

VOLT ab	208.3	208.3	208.2	208.3	V
VOLT bc	208.8	208.8	208.7	208.8	V
VOLT ca	208.6	208.6	208.5	208.6	V
AMPS a	30.5	30.5	30.5	30.5	A
AMPS b	29.5	29.6	29.6	29.6	A
AMPS c	29.6	29.6	29.6	29.6	A
WATTS Total	9667.8	9685.7	9681.1	9678.2	W

