Executive Summary

October 1, 2010

Created for:

Report Demo Site
123 Any Street
Anywhere, PA 19047

Definitions

Evaporating Temperature (ET)

is the saturation temperature of the refrigerant as it boils in the evaporator.

Condensing Temperature (CT)

is the saturation temperature of the refrigerant as it condenses in the condenser.

Condensing Temperature over Ambient (COA)

is the difference between the condensing temperature (CT) and the outdoor air temperature (AMB).

Condensing Over Water Temperature (COW)

is the difference between the condensing temperature (CT) and the entering water temperature (EWT) in water cooled units.

Superheat (SH)

is the difference between the suction line temperature (ST) and the evaporating temperature (ET).

Subcooling (SC)

is the difference between the condensing temperature (CT) and the liquid temperature (LT).

Efficiency Index (EI)

is an estimate of an air conditioner's efficiency as a percentage of what its efficiency could be (while running under the same driving conditions) if it was serviced to operate like new. EI can be used to directly estimate the impact of poorly performing air conditioners on utility bills.

Capacity Index (CI)

is an estimate of an air conditioner's total capacity as a percentage of what its capacity could be (while running under the same driving conditions) if it was serviced to operate like new.

Savings

is the estimated annual energy savings ($/yr) that could be achieved for a unit if the performance was improved through service or repair, bringing the EI and CI measurements back to or near 100%.

Site Summary Information

Contractor: Action Air Conditioning Co.

Site:
Report Demo Site
123 Any Street
Anywhere, PA 19047

Number of units:	5
Number of circuits:	5
Total Capacity (tons):	25.0
Total circuits tested in:	5
Total circuits tested out:	5
Total circuits tested in only:	0

Performance Parameter	Pre-Test Value	Current Value
Efficiency Index (EI)	79%	97%
Capacity Index (CI)	80%	94%
Potential Annual Savings	$1,274	$148

Realized Savings
$1,126
% available savings: 88%

EI and CI are capacity weighted average values.

Diagnosis	Pre-Test		Current	
	Circuits	%	Circuits	%
Acceptable	0	0%	5	100%
Low-side HT Problem	1	20%	0	0%
High-side HT problem	1	20%	0	0%
Over charged	1	20%	0	0%
Under charged	1	20%	0	0%
Other problem	1	20%	0	0%
Inoperable	0	0%	0	0%

Unit	Make	Model	Serial Number	Refrig.	Expansion Device	Capacity (tons)
1	Lennox	LGA120H2BH3G	5605E00744	R22	TxV	5.0
2	Carrier	50YQ030310	T309009	R22	Fixed	2.5
3	Lennox	GCS16-072-160-1Y	5601E00914	R22	TxV	6.0
4	Carrier	38AK008-601	3896G00089	R22	TxV	7.5
5	Rheem	RKKA-A048CK13E	1R5639ADAAF330113560	R22	Fixed	4.0

This table reflects the most recent test data available for each circuit of the unit						Difference between the goal and value			
Unit	Circuit	Job	Diagnosis	EI (%)	CI (%)	COA (F)	ET (F)	SH (F)	SC (F)
1	1	POST STG 1*	ACCEPTABLE: Safe and reasonable performance.	95	95	-1	-3	-5	1
2	1	POST STG 1*	ACCEPTABLE: Safe and reasonable performance.	98	92	-5	-5	1	-0
3	1	POST STG 1*	ACCEPTABLE: Safe and reasonable performance.	97	92	-5	-5	-4	-2

Grey shaded area represents values that are outside the optimum performance range.

This table reflects the most recent test data available for each circuit of the unit						Difference between the goal and value			
Unit	Circuit	Job	Diagnosis	EI (%)	CI (%)	COA (F)	ET (F)	SH (F)	SC (F)
4	1	POST STG 1*	ACCEPTABLE: Safe and reasonable performance.	97	97	-0	-2	-5	5
5	1	POST STG 1*	ACCEPTABLE: Safe and reasonable performance.	97	95	-2	-3	2	1

Grey shaded area represents values that are outside the optimum performance range.

Detailed Unit Information

SITE:	Report Demo Site		
UNIT:	1		
CIRCUIT:	1 of 1		
TECHNICIAN:	Vince T.		
PRE-TEST DATE:	10/01/10	**PRE-TEST LABEL:**	--
POST-REPAIR DATE:	10/01/10	**POST-REPAIR LABEL:**	--

Equipment Type:	AC Package
Make:	Lennox
Model	LGA120H2BH3G
Serial Number:	5605E00744
Indoor Expansion Dev.:	TxV
Refrigerant:	R22
High Side Service Port:	Liquid line
Rated EER:	11
Nom. Cooling Capacity:	5 tons

PRE-TEST DIAGNOSIS: DANGER/Leak Check and Repair: Add charge because this is a TxV unit with a cold evaporator and low subcooling.

POST-REPAIR DIAGNOSIS: ACCEPTABLE/No repair needed: Safe and reasonable performance because the data indicates this system is performing as expected given the conditions entered. No further system diagnostics are required.

Performance Parameter	Pre-Test Value	Post-Repair Value	Realized Savings
Efficiency Index (EI)	85%	95%	$132
Capacity Index (CI)	76%	95%	
Potential Annual Savings	$164	$32	

The following values were used for Potential Annual Savings calculation: Annual Runtime 1200 hrs/year, Electrical Cost 13 cents/kWh.

Diagnostics Parameter	Pre-Test			Post-Repair		
	Goal	Value	Evaluation	Goal	Value	Evaluation
Evaporating Temp (ET)	46.8 F	32.4 F	Lo	42.8 F	39.6 F	Ok-
Suction Superheat (SH)	20.0 F	31.6 F	Hi	20.0 F	15.4 F	Ok-
Condenser Over Ambient (COA)	18.9 F	9.9 F	Ok-	17.9 F	17.0 F	Ok
Subcooling (SC)	10.0 F	-0.1 F	Lo	10.0 F	11.0 F	Ok+
Indoor Temp Difference (ITD)	17.1 F	-- F	N/A	16.6 F	-- F	N/A
Condenser Temp (CT)	-- F	93.9 F	N/A	-- F	101.0 F	N/A

Measurement	Pre-Test	Post-Repair
Suction Pressure (SP)	58.0 psig	68.0 psig
Liquid Pressure (LP)	179.0 psig	199.0 psig
Suction Temp (ST)	64.0 F	55.0 F
Liquid Temp (LT)	94.0 F	90.0 F
Return Air (RA)	75.0 F	69.0 F

Measurement	Pre-Test	Post-Repair
Supply Air (SA)	-- F	-- F
Return Air Wet Bulb Temp (RWB)	65.0 F	61.0 F
Supply Air Wet Bulb Temp (SWB)	-- F	-- F
Ambient Temp (AMB)	84.0 F	84.0 F
Air off Condenser Temp (AOC)	-- F	-- F

Detailed Unit Information

SITE:	Report Demo Site		
UNIT:	2		
CIRCUIT:	1 of 1		
TECHNICIAN:	Vince T.		
PRE-TEST DATE:	10/01/10	**PRE-TEST LABEL:**	--
POST-REPAIR DATE:	10/01/10	**POST-REPAIR LABEL:**	--

Equipment Type:	HP Package
Make:	Carrier
Model	50YQ030310
Serial Number:	T309009
Indoor Expansion Dev.:	Fixed
Refrigerant:	R22
High Side Service Port:	Liquid line
Rated SEER:	10
Nom. Cooling Capacity:	2.5 tons

PRE-TEST DIAGNOSIS: DANGER/Tune up lowside: Low-side heat transfer problem and add charge because ET is low, SH is ok and SC is less than goal. Fixing the low-side transfer problem will increase SH, so re-test after repairs to see if charge is needed to make SH ok. Consider increasing indoor airflow by replacing filters, cleaning fan and evap. coil, adjusting fan belt, and/or opening registers.

POST-REPAIR DIAGNOSIS: ACCEPTABLE/No repair needed: Safe and reasonable performance because the data indicates this system is performing as expected given the conditions entered. No further system diagnostics are required.

Performance Parameter	Pre-Test Value	Post-Repair Value	Realized Savings
Efficiency Index (EI)	84%	98%	$74
Capacity Index (CI)	79%	92%	
Potential Annual Savings	$90	$16	

The following values were used for Potential Annual Savings calculation: Annual Runtime 1200 hrs/year, Electrical Cost 13 cents/kWh.

Diagnostics Parameter	Pre-Test			Post-Repair		
	Goal	Value	Evaluation	Goal	Value	Evaluation
Evaporating Temp (ET)	40.7 F	26.8 F	Lo	41.5 F	36.8 F	Ok-
Suction Superheat (SH)	9.5 F	1.2 F	Ok-	10.4 F	11.2 F	Ok
Condenser Over Ambient (COA)	26.4 F	18.6 F	Ok-	27.0 F	21.7 F	Ok-
Subcooling (SC)	14.0 F	10.6 F	Ok-	13.8 F	13.7 F	Ok
Indoor Temp Difference (ITD)	19.9 F	-- F	N/A	18.2 F	-- F	N/A
Condenser Temp (CT)	-- F	97.6 F	N/A	-- F	101.7 F	N/A

Measurement	Pre-Test	Post-Repair
Suction Pressure (SP)	51.0 psig	64.0 psig
Liquid Pressure (LP)	189.0 psig	201.0 psig
Suction Temp (ST)	28.0 F	48.0 F
Liquid Temp (LT)	87.0 F	88.0 F
Return Air (RA)	74.0 F	72.0 F

Measurement	Pre-Test	Post-Repair
Supply Air (SA)	-- F	-- F
Return Air Wet Bulb Temp (RWB)	60.0 F	61.0 F
Supply Air Wet Bulb Temp (SWB)	-- F	-- F
Ambient Temp (AMB)	79.0 F	80.0 F
Air off Condenser Temp (AOC)	-- F	-- F

Detailed Unit Information

SITE:	Report Demo Site		
UNIT:	3		
CIRCUIT:	1 of 1		
TECHNICIAN:	Vince T.		
PRE-TEST DATE:	10/01/10	**PRE-TEST LABEL:**	--
POST-REPAIR DATE:	10/01/10	**POST-REPAIR LABEL:**	--

Equipment Type:	AC Package
Make:	Lennox
Model	GCS16-072-160-1Y
Serial Number:	5601E00914
Indoor Expansion Dev.:	TxV
Refrigerant:	R22
High Side Service Port:	Liquid line
Rated SEER:	12
Nom. Cooling Capacity:	6 tons

PRE-TEST DIAGNOSIS: DANGER/Tune up high-side: High-side heat transfer problem because condenser is hot and there is no indication of over charge. Also consider doing a standing pressure test for non-condensibles to explain these results.

POST-REPAIR DIAGNOSIS: ACCEPTABLE/No repair needed: Safe and reasonable performance because the data indicates this system is performing as expected given the conditions entered. No further system diagnostics are required.

Performance Parameter	Pre-Test Value	Post-Repair Value	Realized Savings
Efficiency Index (EI)	74%	97%	$270
Capacity Index (CI)	85%	92%	
Potential Annual Savings	$306	$36	

The following values were used for Potential Annual Savings calculation: Annual Runtime 1200 hrs/year, Electrical Cost 13 cents/kWh.

Diagnostics Parameter	Pre-Test			Post-Repair		
	Goal	Value	Evaluation	Goal	Value	Evaluation
Evaporating Temp (ET)	44.8 F	37.5 F	Ok-	44.8 F	39.6 F	Ok-
Suction Superheat (SH)	20.0 F	22.5 F	Ok+	20.0 F	16.4 F	Ok-
Condenser Over Ambient (COA)	21.6 F	32.8 F	Hi	21.6 F	16.4 F	Ok-
Subcooling (SC)	10.0 F	7.8 F	Ok-	10.0 F	8.4 F	Ok-
Indoor Temp Difference (ITD)	18.1 F	-- F	N/A	17.5 F	-- F	N/A
Condenser Temp (CT)	-- F	122.8 F	N/A	-- F	106.4 F	N/A

Measurement	Pre-Test	Post-Repair
Suction Pressure (SP)	65.0 psig	68.0 psig
Liquid Pressure (LP)	270.0 psig	215.0 psig
Suction Temp (ST)	60.0 F	56.0 F
Liquid Temp (LT)	115.0 F	98.0 F
Return Air (RA)	74.0 F	73.0 F

Measurement	Pre-Test	Post-Repair
Supply Air (SA)	-- F	-- F
Return Air Wet Bulb Temp (RWB)	63.0 F	63.0 F
Supply Air Wet Bulb Temp (SWB)	-- F	-- F
Ambient Temp (AMB)	90.0 F	90.0 F
Air off Condenser Temp (AOC)	-- F	-- F

Detailed Unit Information

SITE:	Report Demo Site		
UNIT:	4		
CIRCUIT:	1 of 1		
TECHNICIAN:	Vince T.		
PRE-TEST DATE:	10/01/10	**PRE-TEST LABEL:**	--
POST-REPAIR DATE:	10/01/10	**POST-REPAIR LABEL:**	--

Equipment Type:	AC Split
Make:	Carrier
Model	38AK008-601
Serial Number:	3896G00089
Indoor Expansion Dev.:	TxV
Refrigerant:	R22
High Side Service Port:	Liquid line
Rated SEER:	10
Nom. Cooling Capacity:	7.5 tons

PRE-TEST DIAGNOSIS: DANGER/Recover Charge: Recover charge because this is a TxV unit with a hot condenser and high subcooling.

POST-REPAIR DIAGNOSIS: ACCEPTABLE/No repair needed: Safe and reasonable performance because the data indicates this system is performing as expected given the conditions entered. No further system diagnostics are required.

Performance Parameter	Pre-Test Value	Post-Repair Value	Realized Savings
Efficiency Index (EI)	68%	97%	$480
Capacity Index (CI)	85%	97%	
Potential Annual Savings	$518	$38	

The following values were used for Potential Annual Savings calculation: Annual Runtime 1200 hrs/year, Electrical Cost 13 cents/kWh.

Diagnostics Parameter	Pre-Test			Post-Repair		
	Goal	Value	Evaluation	Goal	Value	Evaluation
Evaporating Temp (ET)	54.2 F	44.3 F	Ok-	52.6 F	50.5 F	Ok-
Suction Superheat (SH)	20.0 F	1.7 F	Lo	20.0 F	15.5 F	Ok-
Condenser Over Ambient (COA)	25.3 F	38.3 F	Hi	25.4 F	25.0 F	Ok
Subcooling (SC)	10.0 F	18.3 F	Hi	10.0 F	15.0 F	Ok+
Indoor Temp Difference (ITD)	10.0 F	-- F	N/A	10.6 F	-- F	N/A
Condenser Temp (CT)	-- F	133.3 F	N/A	-- F	120.0 F	N/A

Measurement	Pre-Test	Post-Repair
Suction Pressure (SP)	75.0 psig	85.0 psig
Liquid Pressure (LP)	310.0 psig	260.0 psig
Suction Temp (ST)	46.0 F	66.0 F
Liquid Temp (LT)	115.0 F	105.0 F
Return Air (RA)	78.0 F	75.0 F

Measurement	Pre-Test	Post-Repair
Supply Air (SA)	-- F	-- F
Return Air Wet Bulb Temp (RWB)	74.0 F	72.0 F
Supply Air Wet Bulb Temp (SWB)	-- F	-- F
Ambient Temp (AMB)	95.0 F	95.0 F
Air off Condenser Temp (AOC)	-- F	-- F

Detailed Unit Information

SITE:	Report Demo Site		
UNIT:	5		
CIRCUIT:	1 of 1		
TECHNICIAN:	Vince T.		
PRE-TEST DATE:	10/01/10	**PRE-TEST LABEL:**	--
POST-REPAIR DATE:	10/01/10	**POST-REPAIR LABEL:**	--

Equipment Type:	AC Package
Make:	Rheem
Model	RKKA-A048CK13E
Serial Number:	1R5639ADAAF330113560
Indoor Expansion Dev.:	Fixed
Refrigerant:	R22
High Side Service Port:	Liquid line
Rated SEER:	10
Nom. Cooling Capacity:	4 tons

PRE-TEST DIAGNOSIS: DANGER/Major Repair: Refrigerant flow restriction because ET is less than goal and SH and SC are high and COA is less than goal.

POST-REPAIR DIAGNOSIS: ACCEPTABLE/No repair needed: Safe and reasonable performance because the data indicates this system is performing as expected given the conditions entered. No further system diagnostics are required.

Performance Parameter	Pre-Test Value	Post-Repair Value	Realized Savings
Efficiency Index (EI)	83%	97%	$170
Capacity Index (CI)	74%	95%	
Potential Annual Savings	$196	$26	

The following values were used for Potential Annual Savings calculation: Annual Runtime 1200 hrs/year, Electrical Cost 13 cents/kWh.

Diagnostics Parameter	Pre-Test			Post-Repair		
	Goal	Value	Evaluation	Goal	Value	Evaluation
Evaporating Temp (ET)	47.6 F	31.6 F	Lo	45.8 F	43.0 F	Ok-
Suction Superheat (SH)	19.3 F	31.4 F	Hi	13.9 F	16.0 F	Ok+
Condenser Over Ambient (COA)	29.3 F	20.0 F	Ok-	28.3 F	26.2 F	Ok-
Subcooling (SC)	11.8 F	20.0 F	Hi	11.8 F	13.2 F	Ok+
Indoor Temp Difference (ITD)	15.3 F	-- F	N/A	15.9 F	-- F	N/A
Condenser Temp (CT)	-- F	108.0 F	N/A	-- F	114.2 F	N/A

Measurement	Pre-Test	Post-Repair
Suction Pressure (SP)	57.0 psig	73.0 psig
Liquid Pressure (LP)	220.0 psig	240.0 psig
Suction Temp (ST)	63.0 F	59.0 F
Liquid Temp (LT)	88.0 F	101.0 F
Return Air (RA)	78.0 F	74.0 F

Measurement	Pre-Test	Post-Repair
Supply Air (SA)	-- F	-- F
Return Air Wet Bulb Temp (RWB)	69.0 F	66.0 F
Supply Air Wet Bulb Temp (SWB)	-- F	-- F
Ambient Temp (AMB)	88.0 F	88.0 F
Air off Condenser Temp (AOC)	-- F	-- F