93.115

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Procedure For HVAC System, Testing, Repair, And Quality Improvement

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Creators of CheckMe!®

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_____	_____
Signature	Date
_____	_____
Name	Company

93.115

SHELL LEAKAGE TESTING PROCEDURE

All appliances should pass the Combustion Appliance Safety Test Procedure prior to this test.

Date _____ Name _____ Phone _____

Address _____ City _____

1.	Inform the homeowner of the purpose and procedures of your part of the project. Inform them that you will test the leakage of the building shell. This will require: • Closing all windows and doors. • Closing all fireplace or wood stove dampers. • Ensuring that all exhaust devices remain off. • Opening all interior doors to individual rooms. Have the customer accompany you while you perform these tasks.
2.	If there are any openings that must be blocked off before the test is taken (fireplace without damper, whole house fan, etc.) record their presence in the comments and block them.
3.	Install the blower door to pressurize the house. Zero the gages with all windows and doors closed and all exhaust devices off.
4.	Adjust all combustion appliances to the pilot or off positions for the duration of the tests.
5. _____ # of Stories _____ Shielding	Check and record building height (in # of stories) and the shielding factor for the building.
6. _____ House Pressure _____ Fan Flow _____ Flow Ring	Pressurize the building to 50 pa. and record the results of the single point CFM50 measurement. Do not forget to use low flow rings (to maintain minimum fan pressure) or wind dampening devices if needed.
7.	Return all combustion appliances, windows and doors, dampers, and exhaust appliances to the condition in which they were found.

COMMENTS

This data can be rapidly analyzed by computer programs available from:
Proctor Engineering Group @ 818 Fifth Avenue, San Rafael, CA. 94901 (415) 455-5700

AIR CONDITIONER EFFICIENCY TEST PROCEDURE

Use this form for testing air conditioners when the outdoor temperature is above 70°F
ATTEMPT TO KEEP THE TEMPERATURE AT THE RETURN AIR GRILLE CLOSE TO 80°F

Date _____ Name _____ Phone _____

Address _____ City _____

1.	Inform the homeowner of the purpose and procedures of your part of the project. Inform them that you will test the leakage of the duct system. This will require: • Turning the air conditioner on for the tests. • Making two test holes in the duct system. (They will be patched). • Turning power off to the house for a short period of time.
2. _____ Manf. _____ Mod.	Record the manufacturer and model number from the outside unit nameplate.
3. _____ Capacity _____ EER	Look up the rated cooling capacity and EER for the Air Conditioner in the Carrier Blue Book or ARI directory.
4. _____ Capacity _____ Tons	Convert cooling capacity to tons. Capacity / 12,000 = Tonnage
5.	Make holes to measure temperatures in both the supply and return systems. **THIS MUST BE SOMEWHAT DISTANT FROM THE AIR HANDLER, AS WELL AS WHERE THE AIR IS MIXED AND HAS GOOD VELOCITY.** Prepare thermocouples to measure temperatures in both locations. Do not insert the wet bulb probes yet. They will dry out.
6.	Locate outdoor thermocouple to read temperature of air **entering condenser**
7.	Locate the house meter and breaker panel.
8.	If it is above 75°F outside, open as many windows and doors as necessary to keep the inside temperature as close to 80°F as possible.
9. **A1** ____ Cfm	Record the return duct leakage from the duct leakage test form.
10.	Set thermostat at coolest setting. Turn on the unit and **start watch to measure time.**

11. _____ Grille #1 _____ Grille #2 _____ Grille #3 _____ Grille #4 _____ Total	With the filters in and after at least ten minutes (to allow the coil to get wet), measure every return flow with the flow hood and record the results. **IF SYSTEM HAS A SINGLE RETURN GRILLE, DIVIDE THE GRILLE AND TAKE TWO READINGS. ADD THE SUM OF BOTH READINGS FOR EACH GRILLE.**
12. _____ Supply _____ Return	Measure supply and return plenum pressures.
13. D ____ Sup WB. E ____ Sup DB. F ____ Ret WB. G ____ Ret DB.	**At EXACTLY 15 minutes record:** The supply and return wet bulb and dry bulb temperatures. Make sure the wick for the wet bulb temperature does not dry out.
14. H ____ Meter Kh I ____ # of rev J ____ Seconds	Turn off **ALL** breakers except those to the Air Conditioner and the air handler. Measure watts from house meter test.
15. ____ F°	Record the outdoor air temperature from the outside thermometer.
16.	Set thermostat back to original setting.
17. A_2 ____ Cfm	Calculate the amount of return system duct leakage at actual operating pressures using the information from step # 12 and the multiplier table (provided).
18. Total Flow C_____ CFM/Ton _____	Calculate total system air flow. Total system air flow equals: _____ (A_2) Return leakage + _____ (B) Total grill flow = _____ (C) Total flow Calculate Air Flow / Nominal Ton _____ (C) Flow across coil ÷ ____Tons = _____ CFM/Ton

SENSIBLE AND LATENT CAPACITY

19.

SENSIBLE CAPACITY (H_S)

(G) _____ Ret dry bulb - (E) _____ Sup dry bulb = _____ Temp. Split

(C) _____ CFM X _____ Temp. Split X 1.08 = (H_S)_____ Btu/hr.

LATENT CAPACITY (H_L)

(F) _____ Return wet (G) _____ dry _____ Return Grains/lb (from chart)

(D) _____ Supply wet (E) _____ dry - _____ Supply Grains/lb (from chart)

= _____ Change in Grains per lb

(C) _____ CFM X _____ Change in Grains X .68 = (H_L)_____ Btu/hr.

CHECK CALCULATION

_____ (H_L) + _____ (H_S) = _____ (H_{T1})

TOTAL CAPACITY

20.

ENTHALPY CHANGE

(F) _____ Return wet bulb _____ Return Enthalpy (from table)

(D) _____ Supply wet bulb -_____ Supply Enthalpy (from table)

= _____ Change in Enthalpy

TOTAL CAPACITY (H_{T2})

(C) _____ CFM X _____ Change in Enthalpy X 4.5 = (H_{T2})_____ Btu/hr.

If H_{T1} is not within 10% of H_{T2} the Final Cooling Efficiency test must be redone.

INPUT AND EER

21.

ACTUAL INPUT

(H)___ Kh X (I) ____ # of Revs. X 3600) ÷ (J) ____ seconds = _____ INPUT (Watts)

ENERGY EFFICIENCY RATIO

(H_{T2})_____ CAPACITY ÷ _____ INPUT = _____ **EER**

The result should be plotted on the attached EER graph. The result should be above the minimum line for the air conditioner with the same EER rating.

93.115

FURNACE EFFICIENCY TEST PROCEDURE

All appliances should pass the Combustion Appliance Safety Test Procedure prior to this test.

Date _____ Name _____ Phone _____

Address _____ City _____

1.	Inform the homeowner of the purpose and procedures of your part of the project. Inform them that you will test the efficiency of the heating system . This will require: • Turning the furnace on for the tests. • Making two test holes in the duct system. (They will be patched).
2.	Cycle heating system from thermostat before starting to make sure it works. If heating system does not turn on, STOP! Inform customer.
3.	Set thermostat down to lowest setting.
4.	Drill holes in hot air delivery and return air plenums. Insert thermocouples to measure the temperatures.
5. _____ Measured Amps _____ Anticipator	Measure the amperage through the thermostat with your ammeter and record the measured amperage. Check the anticipator and record its setting.
6.	Set the thermostat at the warmest setting and start your stop watch to time the five minute heat rise test.
7. _____ Fan On Temp. _____ Fan On Time	Record the temperature at the supply plenum when the air handler fan turns on. Also record the elapsed time to fan on.
8. _____ CLS Temp. _____ CLS Time _____ Limit Setting	While waiting for heat rise test, if gas shuts off, record temperature at supply plenum and time. If gas shuts off, record the limit switch setting. If the gas shuts off, record cycled on the limit switch (CLS) on STEP #9 and move to STEP #10.
9. _____ Supply - _____ Return _____ Δ T (A)	**At five minutes,** measure the heat rise and record (hot air temperature minus the return air temperature). HEAT RISE CAN'T BE MEASURED IF THE SYSTEM CYCLED ON THE LIMIT SWITCH! (Always show subtraction)
10. _____ SSE (B)	Measure the furnaces steady state efficiency after at least twenty minutes of continual burn time.
11.	Set thermostat back to original setting.
12. ____ Fan Off Temp.(C)	Record the temperature at supply plenum when the air handler fan shuts off.
13. _____ Efficiency	Efficiency ≈ SSE (B) +.05 - .0008 X Δ T (A) - 1.1 X ((C) - 83) / 300 This calculation applies to conventional furnaces with stamped steel heat exchangers only.

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93.115

DUCT LEAKAGE TESTING PROCEDURE

All appliances should pass the Combustion Appliance Safety Test Procedure prior to this test.

Date _____ Name _____ Phone _____

Address _____ City _____

1.	Inform the homeowner of the purpose and procedures of your part of the project. Inform them that you will test the leakage of the duct system. This will require: • Covering all supply and return grilles. • Making two test holes in the duct system. (They will be patched).
2.	Seal all registers in the home with paper and masking tape. Have the customer assist you in finding all of the registers.
3.	Make holes to measure pressures in both the supply and return systems. **THIS MUST BE SOMEWHAT DISTANT FROM THE AIR HANDLER.**
4.	Install Duct Blaster™ at the largest least restrictive return grille. If the return system is extremely leaky or restrictive install the Duct Blaster™ at the air handler blower compartment opening. Remove Filter.
5. _____ S. Pressure _____ R. Pressure _____ DB Fan Press 0 1 2 3 DB Flow Ring	Pressurize the supply plenum to 25 pa ΔP with respect to outside. As soon as the supply plenum is at 25 pa ΔP with respect to outside, Check every register seal to ensure an air tight seal and measure both plenum pressures, fan pressure, and flow ring configuration. Once all measurements have been made turn off the Duct Blaster™.
6. _____ S. Pressure _____ R. Pressure	Cover the opening of the Duct Blaster™ and perform the Half Nelson by turning on the air handler fan at the fan switch on the thermostat. Record the return and supply plenum pressures. Do not leave the fan on any longer than necessary.
7. _____ B	Divide the supply pressure by the return pressure to obtain B.
8. _____ DB Airflow	Calculate the air flow through the Duct Blaster™ using the formulas supplied with the Duct Blaster™.
9. _____ S. Leakage +_____ R. Leakage _____ Total Leakage	Using the Half Nelson/leakage at 50 tables (provided) calculate the supply and return leakages. Leakage equals CFM flow measured with Duct Blaster™ times the multiplier from the table.
10.	When leakage testing has been completed make sure that all coverings over the registers are removed and the filter reinstalled.

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COMBUSTION APPLIANCE SAFETY TEST PROCEDURE

All houses MUST pass these tests before & after any duct or shell sealing work is performed

Date _____ Name _____ Phone _____

Address _____ City _____

COMMONLY VENTED UNITS

Tests should take place with the appliances in the configuration that they normally function.

WATER HEATER & FURNACE TESTS

1.	Place thermometer outside in the shade on way into the home.
2.	Cycle heating system from thermostat before starting to make sure it works. Relight pilot if necessary. If heating system does not turn on, STOP! Inform customer.
3.	Set thermostat down.
4. _____	Record outside temperature
5. Yes No Location_____ _____	Do you smell any gas leaks near the furnace or water heater? If gas leaks are detected record the location of all leaks found and inform customer of the repairs needed. Record all gas leaks as emergency situations. If there is a major gas leak **discontinue testing.**
6.	Turn on all fans that exhaust from the home (including cloths dryer, Jennaire™ type stoves, central vacuum systems, but not a whole house fan). Clean or remove any filters in the dryer/exhaust fans. **Close all exterior windows and doors.**
7. Draft Hood Yes No	Does the furnace have a draft hood? If there is, drill a hole in gas vent two feet above the draft hood. If the furnace has an induced draft, drill hole in the flue two feet from the cabinet.
8	Drill a hole in the water heater gas vent two feet above the draft hood
9. Yes No	(Open combustion forced-air only) Does heating system draw return air from the furnace room? If Yes, the return opening must be fixed. Record the work and materials needed in the comments.
9. Yes No	Is there is any carbon in the furnace heat exchanger(s), draft hood, or gas vent?
10. Yes No	Is there is any carbon in the water heater center tube, draft hood, or gas vent?

93.115 ver 3.1 November 16, 1994

11. _____ _____ _____ Total _____A	List the input ratings of all of the gas appliances in the space: Calculate total input
12.	Mark the existing water temperature setting on the water heater. Raise the temperature setting or run water to keep burner on for five minutes.
13.	Close door to the water heater and heating system room.
14.	Set furnace thermostat to highest setting. Start your watch for five minute safety test when burners ignite.
15. White Flames? Yes No Roll out? Yes No	Check how flames are burning. Do you notice any yellow/white in the flames? If yes, record in comments. Any Roll out? If yes, record in comments. If rollout is severe inform customer of the repairs needed, record as emergency and **discontinue testing.**
16. Flame Interference Yes No	(Forced-Air Only) Do furnace flames burn differently with the fan operating? **If Yes, STOP!** Inform the customer that the furnace must have a cracked heat exchanger test performed before the program can work on their home. **Discontinue testing.**
17. Yes No	While waiting, is the flue or vent disconnected, rusted, or have any other defect that can leak combustion products into the home? If Yes, inform customer of the repairs needed, record in comments and as an emergency. **Discontinue testing.**
18.	Record the location of the water heater and furnace.
19. Required A /4000= sq.in Present High /Low sq.in	Calculate combustion air area required in each location. High and low **free area*** present * If free area is unknown assume 50% of gross area.
Required A /20 = cu.ft. Present _____ cu.ft.	**OR** Calculate combustion air volume required Unobstructed volume present
Yes No	Is there adequate combustion air for all the appliances in the space?

20.	If there is inadequate combustion air, inform customer and record the size and location of vents needed in comments.
21. C.O. Yes No Draft_____ Spillage Yes No	At five minutes, check the furnace with the gas burning:
22. C.O. Yes No Draft_____ Spillage Yes No	At five minutes, check the water heater with the gas burning:
23. C.O. Yes No Draft_____ Spillage Yes No	Open the water heater/furnace room door and check the furnace with the gas burning:
24. C.O. Yes No Draft_____ Spillage Yes No	Open the water heater/furnace room door and check the water heater with the gas burning:
25.	If C.O. exceeds 100 ppm, record all details necessary in comments and inform customer of the repairs needed. Record as an emergency situation.
26. ACCEPTABLE DRAFT IS: Outside temp > 80°F -.005" or more negative Outside temp 30 to 80°F -.01" or more negative Outside temp < 30°F -.02" or more negative	If spillage is present, or draft is not acceptable, inform customer of the repairs needed. **IF SPILLAGE IS PRESENT, OR COMBUSTION PRODUCTS ARE LEAKING FROM THE FLUE/VENT AND CO EXCEEDS 100 PPM, RECORD AS EMERGENCY, INFORM CUSTOMER OF THE REPAIRS NEEDED. DISCONTINUE TESTING.**
27.	Set the furnace thermostat down and return the water heater thermostat to original setting. Turn off all exhaust fans turned on in step 6.
28. C.O. Yes No	Turn on gas clothes dryer and start your watch to measure time. At three minutes test at the exhaust outlet for CO. CO content must be less than 100 ppm. If CO exceeds 100 ppm record as emergency, inform customer of the repairs needed.

29. C.O. Yes No	Turn on all burners on the gas oven and stove and start your watch to measure time. At one minute test at approximately twelve inches above each burner individually for CO. At three minutes test at the exhaust outlet of oven. CO content must be less than 100 ppm. If CO exceeds 100 ppm record as emergency, inform customer of the repairs needed.

COMMENTS

COMBUSTION APPLIANCE SAFETY TEST PROCEDURE

All houses MUST pass these tests before & after any duct or shell sealing work is performed

Date _____ Name _____ Phone _____

Address _____ City _____

INDIVIDUALLY VENTED UNITS

Tests should take place with the appliances in the configuration that they normally function.

FURNACE TEST

1.	Place thermometer outside in the shade on way into the home.
2.	Cycle heating system from thermostat before starting to make sure it works. Relight pilot if necessary. If heating system does not turn on, STOP! Inform customer.
3.	Set thermostat down.
4. _____ °F	Record outside temperature
5. Yes No Location_____ _____	Do you smell any gas leaks near the furnace? If gas leaks are detected record the location of all leaks found and inform customer of the repairs needed. Record all gas leaks as emergency situations. If there is a major gas leak **discontinue testing.**
6.	Turn ON all fans that exhaust from the home (including cloths dryer, Jennaire™ type stoves, central vacuum systems, but not a whole house fan). Clean or remove any filters in the dryer/exhaust fans. **Close all exterior windows and doors.**
7. Draft Hood Yes No	Does the furnace have a draft hood? If there is, drill hole in gas vent two feet above the draft hood. If the furnace has an induced draft, drill hole in the flue two feet from the cabinet.
8. Yes No	(Open combustion forced-air only) Does heating system draw return air from the furnace room? If Yes, the return opening must be fixed. Record the work and materials needed in the comments.
9. Yes No	Is there is any carbon in the heat exchanger, draft hood, or gas vent?
10. _____ _____ _____ Total _____A	List the input ratings of all of the gas appliances in the space: Calculate total input (Btuh)
11.	Close door to heating system room.

12.	Set furnace thermostat to highest setting. When burners ignite, start your watch for five minute safety test.
13. White Flames? Yes No Roll out? Yes No	Check how flames are burning. Do you notice any yellow/white in the flames? Any Roll out? If rollout is severe inform customer of the repairs needed, record as emergency and **discontinue testing.**
14. Flame Interference Yes No	(Forced-Air Only) Do furnace flames burn differently with the fan operating? **If Yes, STOP!** Inform the customer that the furnace must have a cracked heat exchanger test performed. **Discontinue testing.**
15. Yes No	While waiting, is the flue or vent disconnected, rusted, or have any other defect that can leak combustion products into the home? If Yes, inform customer of the repairs needed, record as emergency and **discontinue testing.**
16. _____	Record the location of the furnace.
17. Required A _____ /4000= _____ sq.in Present High _____ /Low _____ sq.in Required A _____ /20 = _____ cu.ft. Present _____ cu.ft. Yes No	Calculate combustion air area required in each location. High and low **free area*** present * If free area is unknown assume 50% of gross area. **OR** Calculate combustion air volume required Unobstructed volume present Is there adequate combustion air for all the appliances in the space?
18.	If there is inadequate combustion air, inform customer and record the size and location of vents needed in comments.
19. C.O. Yes No Draft_____ Spillage Yes No	At five minutes, check the furnace with the gas burning:
20. C.O. Yes No Draft_____ Spillage Yes No	Open the furnace room door and check furnace with the gas burning:

21.	If C.O. exceeds 100 ppm, record the heat exchanger shell(s) that have C.O. present and inform customer of the repairs needed. Record as an emergency situation.
22. ACCEPTABLE DRAFT IS: Outside temp > 80°F -.005" or more negative Outside temp 30 to 80°F -.01" or more negative Outside temp < 30°F -.02" or more negative	If spillage is present, or draft is not acceptable, inform customer of the repairs needed. **IF SPILLAGE IS PRESENT, OR COMBUSTION PRODUCTS ARE LEAKING FROM THE FLUE/VENT AND CO EXCEEDS 100 PPM, RECORD AS EMERGENCY, INFORM CUSTOMER OF THE REPAIRS NEEDED. DISCONTINUE TESTING.**
23.	Set the thermostat down and the fan switch to ON.

WATER HEATER TEST

24. _____	Record the location of the water heater.
25.	Drill hole in gas vent two feet above the draft hood.
26. Yes No	Is there is any carbon in the center tube, draft hood, or gas vent?
27. Yes No Location_____ _____	Do you smell any gas leaks near the water heater? If gas leaks are detected record the location of all leaks found and inform customer of the repairs needed. Record all gas leaks as emergency situations. If there is a major gas leak **discontinue testing.**
28.	Close door to water heater room
29.	Mark the existing water temperature setting.
30.	Raise the temperature setting or run water to keep burner on for five minutes. Start your watch for five minute test.
31. _____ _____ _____ Total _____A	List the input ratings of all of the gas appliances in the space: Calculate total input
32. Yes No	While waiting, is the flue or vent disconnected, rusted, or have any other defect that can leak combustion products into the home? If Yes, inform customer of the repairs needed, record as emergency and **discontinue testing.**

33. Required A _____ /4000= _____ sq.in Present High _____ /Low _____ sq.in Required A _____ /20 = _____ cu.ft. Present _____ cu.ft. Yes No	Calculate combustion air area required in each location. High and low **free area*** present * If free area is unknown assume 50% of gross area. **OR** Calculate combustion air volume required Unobstructed volume present Is there adequate combustion air for all the appliances in the space?
34	If there is inadequate combustion air, inform customer and record the size and location of vents needed in comments.
35. C.O. Yes No Draft_____ Spillage Yes No	At five minutes, check the water heater with the gas burning:
36. C.O. Yes No Draft_____ Spillage Yes No	Open the water heater room door and check water heater with the gas burning:
37.	If C.O. exceeds 100 ppm, inform customer of the repairs needed. Record as an emergency situation.
38. ACCEPTABLE DRAFT IS: Outside temp > 80°F -.005" or more negative Outside temp 30 to 80°F -.01" or more negative Outside temp < 30°F -.02" or more negative	If spillage is present, or draft is not acceptable, inform customer of the repairs needed. **IF SPILLAGE IS PRESENT, OR COMBUSTION PRODUCTS ARE LEAKING FROM THE FLUE/VENT AND CO EXCEEDS 100 PPM, RECORD AS EMERGENCY, INFORM CUSTOMER OF THE REPAIRS NEEDED.**
39.	Return water heater thermostat to original setting and turn off all exhaust fans turned on in step 6. Turn the furnace fan to AUTO.

40. C.O. Yes No	Turn on gas clothes dryer and start your watch to measure time. At three minutes test at the exhaust outlet for CO. CO content must be less than 100 ppm. If CO exceeds 100 ppm record as emergency, inform customer of the repairs needed.
41. C.O. Yes No	Turn on all burners on the gas oven and stove and start your watch to measure time. At one minute test at approximately twelve inches above each burner individually for CO. At three minutes test at the exhaust outlet of oven. CO content must be less than 100 ppm. If CO exceeds 100 ppm record as emergency, inform customer of the repairs needed.

COMMENTS

HEAT PUMP EFFICIENCY TEST PROCEDURE

Date _____ Name _____ Phone _____

Address _____ City _____

1.	Inform the homeowner of the purpose and procedures of your part of the project. Inform them that you will test the leakage of the duct system. This will require: • Turning the heat pump on for the tests. • Making two test holes in the duct system. (They will be patched). • Turning power off to the house for a short period of time.
2. _____ Manf. _____ Mod.	Record the manufacturer and model number from the outside unit nameplate.
3. _____ Capacity _____ EER	Look up the rated cooling capacity and EER for the Air Conditioner in the Carrier Blue Book or ARI directory.
4. _____ Capacity _____ Tons	Convert cooling capacity to tons. Capacity / 12,000 = Tonnage
5.	Make holes to measure temperatures in the two supply ducts close to the plenum and in one hole in the return plenum. **THE SUPPLY HOLES MUST BE SOMEWHAT DISTANT FROM THE COIL. THERMO-COUPLES CAN NOT BE ALLOWED TO SEE THE STRIP HEAT.** Prepare thermocouples to measure temperatures in all three locations.
6.	Locate outdoor thermocouple to read temperature of air **entering condenser**
7. ❒ Yes ❒ No	Start heat pump by activating **ONLY** the first stage with thermostat. Check and record if there is current to the strip heaters.
8.	Switch the thermostat to the emergency heat mode, set to highest setting and start your watch to measure times.
9. _____ Supply -_____ Return _____ Δ T	**At EXACTLY 5 minutes record:** The two supplies and return temperature. The average supply temperature minus the return temperature determines the temperature differential. (_____ #1 Supply + _____ #2 Supply) /2 = _____ Supply Avg.
10. _____ Amps #1 _____ Amps #2 _____ Volts	Measure and record the volts and amps on both legs to the heat strips.
11.	Set the thermostat back to its original setting.

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12. AIR FLOW = Strip Heater _____ Amps. X _____ Volts = ___ Watts Air Flow (_____ Watts / _____ ΔT) X 3.16 = _____ CFM Air Flow / Nom. Ton _____ CFM / Tons ___ = _____ CFM/Ton	
13.	**Disable the heat strips by turning off a breaker or removing a thermostat wire.** Only the power to the compressor and air handler must remain on.
14.	Switch to compressor only heating, set at warmest setting and restart your stop watch.
15. _____ Supply -_____ Return _____ ΔT	**At EXACTLY 15 minutes record:** The two supplies and return temperature. The average supply temperature minus the return temperature determines the compressor cycle temperature differential. (____ #1 Supply + _____ #2 Supply) /2 = _____ Supply Avg.
16. _____ F°	Record the outdoor air temperature from the outside thermometer.
17. _____ Meter Kh _____ # of rev _____ Seconds _____ Multiplier	Turn off all breakers except those to the heat pump and the air handler. Measure watts from house meter test.
18.	Set thermostat back to original setting.
19. OUTPUT (CAPACITY) (_____ Strip Watts / _____ ΔT Strip) X _____ΔT Comp. = _____ Watts 20. ACTUAL INPUT Watts from house watt meter: (_____ Kh X _____ # of Revs. X 3600) / _____ seconds = _____ Watts 21. COEFFICIENT OF PERFORMANCE _____ OUTPUT / _____ ACTUAL INPUT = _____ **C.O.P.**	
22.	Use the minimum temperature split table and COP chart to determine if the system capacity and efficiency are within the allowable range.

COMMENTS

