# Carrier Enterprise A/C / Heat Pump System Analyzer

*This form MUST be completed prior to requesting Site Visit*

Distributor: _____ Case Number: _____

Dealer: _____ Fail Date: _____

Technician's Name: _____ Installation date: _____

| MODEL INFO | Model # | Serial # |
|---|---|---|
| Package Unit: | | |
| Air Cleaner: | | |
| UV Lights: | | |
| Thermostat: | | |
| Electronic Air Cleaner: | | |
| Humidifier: | | |

## COMPRESSOR DATA

Comfort Alert Code: _____

Comp. Start Voltage: _____ Vac

Comp. Run Amps: Com_____ Run_____ Start_____

Locked Rotor Amps: _____ amps R→S=_____Ω

Run Cap: _____ μF(1Φ only) R→C=_____Ω

Do Refrigerant Pressures Equal When Power is Removed?: ☐ yes ____no S→C=_____Ω

Hard Start Kit Used?: ☐ yes ____no R→S ≈ R→C+C→S

## REFRIGERANT PROPERTIES

A. Vapor Line Temp. at Service Port: _____°F SuperHeat_____°F (A - B)

B. Vapor Pressure at Service Port: _____psig = _____°F

C. Liquid Line Temp. at Service Port: _____°F SubCooling_____°F (D - C)

D. Liquid Pressure at Service Port: _____psig = _____°F

## AC/HP PROPERTIES

Filter Type: _____

Return Air: _____°FDB _____°FWB

Supply Air: _____°FDB _____°FWB

Supply Static Pressure*: Hi_____"w.c.

Return Static Pressure*: Hi_____"w.c.

cfm: _____ cfm

Clg. Metering Device: ____txv ____piston #_____

Htg.Metering Device: ☐ txv ____piston #____

Clg. Blower Speed Tap: Hi ____ Lo_____

Blower Amps: Hi Cool_____amps Lo Cool_____amps

Defrost Time Interval: _____ min Quite Shift: ____On ____ Off

Air Temp Entering Outdoor Coil: _____°F

Air Temp Leaving Outdoor Coil: _____°F

Outdoor Fan Amps: _____ amps

## ADDTL. COMMENTS:

## ELECTRICAL INFO

Control Voltage: _____ Vac

Supply Voltage: _____ Vac Φ____

3 Phase (Φ) Voltages: T1→T2_____Vac

T1→T3_____Vac T2→T3_____Vac

## AIRFLOW (EQ. On page 2)

**Electric Heat Temp Rise CFM Method**

Volts = _____ Amps = _____

Ret. Air Temp.____°F Sup. Air Temp. ____°F

cfm = _____

***Total External Static Method**

Ret. Static + Sup. Static = Total External Static

Use the Total External Static in conjunction with the "Blower Performance" data in the Product Specification Sheets or the unit's "Tech Label".

**NOTE: 350-400 CFM PER TON**

## SYSTEM CAPACITY (Cal. On page 2)

Htg. Capacity (HP): _____btuh

Clg. Capacity (AC/HP): _____btuh

## GAS HEAT PROPERTIES

Local Heat Content**: _____ btu/hr

Seconds per Revolution**: _____sec/rev

High Fire Rate**: _____btu/h NG☐

Low Fire Rate**: _____btu/hr LP☐

Supply Pressure***: _____"w.c.

Orifice #: _____ Flash Code: _____

Manifold Pressure: High Fire: _____"w.c.

Low Fire: _____"w.c.

Htg.Blower Speed Tap: Hi ____ Lo_____

Blower Amps: Hi____amps Lo____amps

Supply Air Temp.: High Fire: _____°F

Low Fire: _____°F

Return Air Temp.: High Fire: _____°F

Low Fire: _____°F

Temperature Rise†: High Fire: _____°F

Low Fire: _____°F

Inducer Amps: High Fire: _____amps

Low Fire: _____amps

Pressure Switch Close: _____"w.c.

Pressure Switch Open: _____"w.c.

Supply Static*: High Fire: _____"w.c.

Return Static*: High Fire: _____"w.c.

Flame Sensor Current: _____μA dc

Heat Off-Delay: _____ sec

* Used in the "Total External Static" method in conjunction with the "Blower Performance Data" in Product Specification sheets or the unit's "Tech Label" to calculate airflow.

*** Supply pressure should be checked with all other gas appliances running.

† Temperature rise is equal to the supply air temp. minus the return air temp. at steady state operation. The supply air temp. should be measured away form the line of sight of the heat exchanger.

# SPP FIELD ASSIST REQUEST FORM (FARF)

## REFERENCE CHARTS

### PRESSURE - TEMPERATURE CHART

| Temp | R-22 | R-410A |
|---|---|---|
| °F | Vapor | Liquid |
| | Pressure | Pressure |
| -50 | **6.2** | 3.5 |
| -45 | **2.7** | 8.5 |
| -40 | **0.5** | 11.6 |
| -35 | **2.6** | 14.9 |
| -30 | **4.9** | 18.5 |
| -25 | **7.4** | 22.5 |
| -20 | **10.1** | 26.9 |
| -15 | **13.2** | 31.7 |
| -10 | **16.5** | 36.8 |
| -5 | **20** | 42.5 |
| 0 | **23.9** | 48.6 |
| 5 | **28.2** | 55.2 |
| 10 | **32.8** | 62.3 |
| 15 | **37.7** | 70 |
| 20 | **43** | 78.3 |
| 25 | **48.7** | 87.3 |
| 30 | **54.9** | 96.8 |
| 35 | **61.5** | 107 |
| 40 | **68.5** | 118 |
| 45 | **76** | 129.7 |
| 50 | **84** | 142.2 |
| 55 | **92.5** | 155.5 |
| 60 | **101.6** | 169.6 |
| 65 | **111.2** | 184.6 |
| 70 | **121.4** | 200.6 |
| 75 | **132.2** | 217.4 |
| 80 | **143.6** | 235.3 |
| 85 | **155.7** | 254.1 |
| 90 | **168.4** | 274.1 |
| 95 | **181.8** | 295.1 |
| 100 | **195.9** | 317.2 |
| 105 | **210.7** | 340.5 |
| 110 | **226.3** | 365 |
| 115 | **242.7** | 390.7 |
| 120 | **259.9** | 417.7 |
| 125 | **277.9** | 445.9 |
| 130 | **296.8** | 475.6 |
| 135 | **316.5** | 506.5 |
| 140 | **337.2** | 539 |
| 145 | **358.8** | 572.8 |
| 150 | **381.5** | 608.1 |

### QUICK SYSTEM ANALYSIS (√)

| SYSTEM PROBLEM | OPERATING TRENDS (LOW-NORMAL-HIGH | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SUCTION PRESSURE | | | DISCHARGE PRESSURE | | | SUPERHEAT | | | SUBCOOLING | | | AMPERES | | |
| | L | N | H | L | N | H | L | N | H | L | N | H | L | N | H |
| Overcharge | | | ● | | | ● | ● | | | | | ● | | | ● |
| Condenser (Air) Restricted | | | ● | | | ● | ● | | | ● | | | | | ● |
| Non-Condensibles in System | | | ● | | | ● | ● | | | ● | | | | | ● |
| High Evaporator Load | | | ● | | | ● | | ● | | | ● | | | | ● |
| Loose TXV Feeder Bulb | | | | | | | | | | | | | | | |
| - Oversized TXV | | | | | | | | | | | | | | | |
| - Leaking TXV Seat | | | ● | | | ● | ● | | | ● | | | | | ● |
| - Wrong Equalizer Connection | | | | | | | | | | | | | | | |
| - Uninsulated Feeder Bulb | | | | | | | | | | | | | | | |
| Undercharge | ● | | | ● | | | | | ● | ● | | | ● | | |
| Liquid Line Restriction | ● | | | ● | | | | | ● | | | ● | ● | | |
| Low Outdoor Ambient | ● | | | ● | | | | | ● | | | ● | ● | | |
| Suction Line Restriction | ● | | | ● | | | | | ● | | | ● | ● | | |
| Evaporator Air (Cooler Liquid) Restricted | ● | | | ● | | | ● | | | | | ● | ● | | |
| Undersized TXV | | | | | | | | | | | | | | | |
| - Leaking Feeder Bulb | ● | | | ● | | | | | ● | | | ● | ● | | |
| - No External Equalizer | | | | | | | | | | | | | | | |
| Inefficient Compressor | | | ● | ● | | | | | ● | | | ● | ● | | |
| ACTUAL SYSTEM OPERATION (✓) | | | | | | | | | | | | | | | |

### SYSTEM CAPACITY CALCULATOR

TEMPERATURE VS. ENTHALPY

| Wet-Bulb (F) | Btu/LB | Wet-Bulb (F) | Btu/LB | Wet-Bulb (F) | Btu/LB | Wet-Bulb (F) | Btu/LB | Wet-Bulb (F) | Btu/LB | Wet-Bulb (F) | Btu/LB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **40** | 15.23 | **48** | 19.21 | **56** | 23.84 | **64** | 29.31 | **72** | 35.83 | **80** | 43.69 |
| **41** | 15.7 | **49** | 19.75 | **57** | 24.48 | **65** | 30.06 | **73** | 36.74 | **81** | 44.78 |
| **42** | 16.17 | **50** | 20.3 | **58** | 25.12 | **66** | 30.83 | **74** | 37.66 | **82** | 45.9 |
| **43** | 16.66 | **51** | 20.86 | **59** | 25.78 | **67** | 31.62 | **75** | 38.61 | **83** | 47.04 |
| **44** | 17.15 | **52** | 21.44 | **60** | 26.46 | **68** | 32.42 | **76** | 39.57 | **84** | 48.22 |
| **45** | 17.65 | **53** | 22.02 | **61** | 27.15 | **69** | 33.25 | **77** | 40.57 | **85** | 49.43 |
| **46** | 18.16 | **54** | 22.62 | **62** | 27.85 | **70** | 34.09 | **78** | 41.58 | | |
| **47** | 18.68 | **55** | 23.22 | **63** | 28.57 | **71** | 34.95 | **79** | 42.62 | | |

**INDOOR COIL (EVAPORATOR)**

| | ENTERING | LEAVING | DIFFERENCE |
|---|---|---|---|
| W.B. | | | |
| Enthalpy | | | Δh = Btu/LB |

**EVAPORATOR CAPACITY**
BTUH = 4.5 x cfm x ΔT

**OUTDOOR COIL (CONDENSOR)**

| | ENTERING | LEAVING | DIFFERENCE |
|---|---|---|---|
| (Air) D.B. | | | ΔT = °F |

**CONDENSOR CAPACITY**
BTUH = 1.10 x COND. Cfm x ΔT

Due to varying field condidtions, a tolerance of 10% must be expected when comparing test data to actual performance.

### AIRFLOW

**Electric Heat Temp Rise Method**

$$\text{cfm} = \frac{(\text{Volts})(\text{Amps})(3.413)}{1.08(\Delta T)}$$

**Furnace**

$$\text{cfm} = \frac{\text{btu output}}{1.08(\Delta T)}$$

### INDOOR DRY BULB ADJUSTMENT

Use equations below in conjunction with unit's "Tech Label" information for total and sensible capacities @ indoor dry bulbs other than 80°F entering coil.

### SYSTEM CAPACITY

**Htg. System Capacity**

btu output =(cfm)(1.08)(ΔT)

### FIRING RATE OUTPUT

$$\text{**Firing Rate} = \frac{\text{Heat Content(Btu/cu.ft) X 3600(sec/hr)}}{\text{seconds per revolution (assume 1 cu.ft dial)}}$$

Sensible Capacity at Indoor db LOWER than 80°F = $\left((\text{MBh x S/T}) - \frac{(80\text{-Indoor db}) \text{ x } 835 \text{ x Indoor cfm}}{1000}\right)$

Sensible Capacity at Indoor db HIGHER then 80°F= $\left((\text{MBh x S/T}) + \frac{(\text{Indoor db-80}) \text{ x } 835 \text{ x Indoor cfm}}{1000}\right)$

* Used in the "Total External Static" method in conjunction with the "Blower Performance Data" in Product Specification sheets or the unit's "Tech Label" to calculate airflow.
*** Supply pressure chould be checked with all other gas appliances running.
† Temperature rise is equal to the supply air temp. minus the return air temp. at steady state operation. The supply air temp. should be measured away form the line of sight of the heat exchanger.