SPP TECHNICAL EVALUATION FORM

United Technologies
Climate | Controls | Security

Distributor: _____ Job Site Reference: _____
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 (C - D)
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.

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REFERENCE CHARTS

PRESSURE - TEMPERATURE CHART

Temp	R-22	R-410A
°F		
	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 Wet-Bulb (F)	Enthalpy Btu/LB	Temperature Wet-Bulb (F)	Enthalpy Btu/LB	Temperature Wet-Bulb (F)	Enthalpy Btu/LB	Temperature Wet-Bulb (F)	Enthalpy Btu/LB	Temperature Wet-Bulb (F)	Enthalpy Btu/LB	Temperature Wet-Bulb (F)	Enthalpy 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 Δh

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

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

Furnace

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

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

**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 = $\left((MBh \times S/T) - \frac{(80\text{-Indoor db}) \times 835 \times \text{Indoor cfm}}{1000}\right)$

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

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