



United Technologies  
Climate | Controls | Security

Job Site Reference: \_\_\_\_\_  
Fail Date: \_\_\_\_\_  
Installation date: \_\_\_\_\_

\* 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.

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# SPP TECHNICAL EVALUATION FORM

## REFERENCE CHARTS

### PRESSURE - TEMPERATURE CHART

| Temp<br>°F | R-22     | R-410A   |
|------------|----------|----------|
|            | 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<br>PROBLEM                         | OPERATING TRENDS (LOW-NORMAL-HIGH) |   |   |                       |   |   |           |   |   |            |   |   |
|-------------------------------------------|------------------------------------|---|---|-----------------------|---|---|-----------|---|---|------------|---|---|
|                                           | SUCTION<br>PRESSURE                |   |   | DISCHARGE<br>PRESSURE |   |   | SUPERHEAT |   |   | SUBCOOLING |   |   |
|                                           | 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  | Enthalpy | Temperature  | Enthalpy | Temperature  | Enthalpy | Temperature  | Enthalpy | Temperature  | Enthalpy | Temperature  | 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)                     |          |         |             | OUTDOOR COIL (CONDENSOR)                           |          |         |            |
|----------------------------------------------|----------|---------|-------------|----------------------------------------------------|----------|---------|------------|
| W.B.                                         | ENTERING | LEAVING | DIFFERENCE  | (Air) D.B.                                         | ENTERING | LEAVING | DIFFERENCE |
| Enthalpy                                     |          |         | Δh = Btu/LB |                                                    |          |         | ΔT = °F    |
| EVAPORATOR CAPACITY<br>BTUH = 4.5 x cfm x Δh |          |         |             | CONDENSOR CAPACITY<br>BTUH = 1.10 x COND. Cfm x ΔT |          |         |            |

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

| AIRFLOW                                                                                                                                                     | SYSTEM CAPACITY                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Electric Heat Temp Rise Method</b>                                                                                                                       | <b>Htg. System Capacity</b><br>btu output =(cfm)(1.08)(ΔT)                                                                               |
| cfm = $\frac{(\text{Volts})(\text{Amps})(3.413)}{1.08(\Delta T)}$                                                                                           |                                                                                                                                          |
| <b>Furnace</b><br>cfm = $\frac{\text{btu output}}{1.08(\Delta T)}$                                                                                          | <b>FIRING RATE OUTPUT</b>                                                                                                                |
| <b>INDOOR DRY BULB ADJUSTMENT</b>                                                                                                                           | **Firing Rate = $\frac{\text{Heat Content (Btu/cu.ft)} \times 3600(\text{sec/hr})}{\text{seconds per revolution (assume 1 cu.ft dial)}}$ |
| 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. |                                                                                                                                          |

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

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

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