



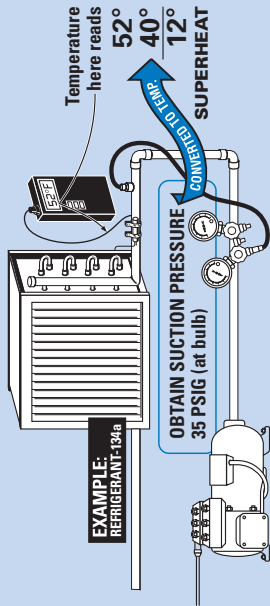
TEMPERATURE PRESSURE CHART - at sea level

| TEMPERATURE | | REFRIGERANT (SPORLAN CODE) | | | | | TEMPERATURE | | REFRIGERANT (SPORLAN CODE) | | | | | TEMPERATURE | | REFRIGERANT (SPORLAN CODE) | | | | |
|-------------|-------|----------------------------|-------------------|--------------------|-------------------|-----------------------|-------------|-------|----------------------------|----------|----------|---------|-----------------------|-------------|------|----------------------------|---------------------|---------------------|---------|-----------------------|
| (°F) | (°C) | 134a (J) | 404A (S) | 407A (S) | 507 (P) | 744 - CO ₂ | (°F) | (°C) | 134a (J) | 404A (S) | 407A (S) | 507 (P) | 744 - CO ₂ | (°F) | (°C) | 134a (J) | 404A (S) | 407A (S) | 507 (P) | 744 - CO ₂ |
| -60 | -51.1 | <i>21.8</i> | <i>7.3</i> | <i>14.5</i> | <i>5.8</i> | 79.9 | 12 | -11.1 | 13.1 | 45.4 | 33.6 | 48.1 | 357.5 | 42 | 5.6 | 37.0 | 88.8 | 72.5 | 92.8 | 569.3 |
| -55 | -48.3 | <i>20.3</i> | <i>3.9</i> | <i>11.9</i> | <i>2.2</i> | 91.1 | 13 | -10.6 | 13.8 | 46.6 | 34.6 | 49.3 | 363.4 | 43 | 6.1 | 38.0 | 90.6 | 74.1 | 94.6 | 577.6 |
| -50 | -45.6 | <i>18.7</i> | <i>0.1</i> | <i>9.0</i> | 0.9 | 103.4 | 14 | -10.0 | 14.4 | 47.8 | 35.7 | 50.5 | 369.5 | 44 | 6.7 | 39.0 | 92.4 | 75.8 | 96.5 | 586.0 |
| -45 | -42.8 | <i>16.9</i> | 2.0 | <i>5.7</i> | 3.0 | 116.7 | 15 | -9.4 | 15.0 | 49.0 | 36.7 | 51.8 | 375.6 | 45 | 7.2 | 40.1 | 94.2 | 77.4 | 98.3 | 594.5 |
| -40 | -40.0 | <i>14.8</i> | 4.3 | <i>2.0</i> | 5.4 | 131.0 | 16 | -8.9 | 15.7 | 50.2 | 37.8 | 53.0 | 381.8 | 46 | 7.8 | 41.1 | 96.0 | 79.1 | 100.2 | 603.1 |
| -35 | -37.2 | <i>12.5</i> | 6.8 | 1.0 | 8.1 | 146.5 | 17 | -8.3 | 16.4 | 51.5 | 38.9 | 54.3 | 388.0 | 47 | 8.3 | 42.2 | 97.9 | 80.8 | 102.1 | 611.7 |
| -30 | -34.4 | <i>9.8</i> | 9.6 | 3.3 | 11.0 | 163.1 | 18 | -7.8 | 17.0 | 52.7 | 40.0 | 55.6 | 394.3 | 48 | 8.9 | 43.2 | 99.8 | 82.6 | 104.1 | 620.5 |
| -25 | -31.7 | <i>6.9</i> | 12.7 | 5.8 | 14.1 | 181.0 | 19 | -7.2 | 17.7 | 54.0 | 41.2 | 56.9 | 400.7 | 49 | 9.4 | 44.3 | 101.7 | 84.3 | 106.0 | 629.3 |
| -20 | -28.9 | <i>3.7</i> | 16.0 | 8.5 | 17.6 | 200.2 | 20 | -6.7 | 18.4 | 55.3 | 42.3 | 58.3 | 407.2 | 50 | 10.0 | 45.4 | 103.6 | 86.1 | 108.0 | 638.3 |
| -18 | -27.8 | <i>2.3</i> | 17.4 | 9.7 | 19.1 | 208.3 | 21 | -6.1 | 19.1 | 56.6 | 43.5 | 59.6 | 413.8 | 55 | 12.8 | 51.2 | <i>115.3</i> | <i>114.4</i> | 118.3 | 684.5 |
| -16 | -26.7 | <i>0.8</i> | 18.9 | 10.9 | 20.6 | 216.5 | 22 | -5.6 | 19.9 | 58.0 | 44.7 | 61.0 | 420.4 | 60 | 15.6 | 57.4 | 126.0 | 125.2 | 129.2 | 733.1 |
| -14 | -25.6 | 0.4 | 20.4 | 12.2 | 22.2 | 225.0 | 23 | -5.0 | 20.6 | 59.3 | 45.9 | 62.4 | 427.1 | 65 | 18.3 | 64.0 | 137.3 | 136.7 | 140.8 | 784.2 |
| -12 | -24.4 | 1.1 | 22.0 | 13.5 | 23.8 | 233.8 | 24 | -4.4 | 21.3 | 60.7 | 47.1 | 63.8 | 433.8 | 70 | 21.1 | 71.1 | 149.3 | 148.8 | 153.0 | 838.1 |
| -10 | -23.3 | 1.9 | 23.6 | 14.9 | 25.5 | 242.7 | 25 | -3.9 | 22.1 | 62.1 | 48.3 | 65.3 | 440.7 | 75 | 23.9 | 78.7 | 162.0 | 161.7 | 165.9 | 894.9 |
| -8 | -22.2 | 2.8 | 25.3 | 16.3 | 27.3 | 251.9 | 26 | -3.3 | 22.9 | 63.5 | 49.6 | 66.7 | 447.6 | 80 | 26.7 | 86.7 | 175.4 | 175.3 | 179.6 | 954.9 |
| -6 | -21.1 | 3.6 | 27.0 | 17.8 | 29.1 | 261.3 | 27 | -2.8 | 23.7 | 64.9 | 50.9 | 68.2 | 454.6 | 85 | 29.4 | 95.2 | 189.5 | 189.7 | 194.1 | 1018.4 |
| -4 | -20.0 | 4.6 | 28.8 | 19.3 | 30.9 | 271.0 | 28 | -2.2 | 24.5 | 66.4 | 52.2 | 69.7 | 461.7 | 90 | 32.2 | 104.3 | 204.5 | 204.8 | 209.3 | * |
| -2 | -18.9 | 5.5 | 30.7 | 20.9 | 32.8 | 280.9 | 29 | -1.7 | 25.3 | 67.8 | 53.5 | 71.2 | 468.8 | 95 | 35.0 | 114.0 | 220.2 | 220.8 | 225.4 | * |
| 0 | -17.8 | 6.5 | 32.6 | 22.5 | 34.8 | 291.0 | 30 | -1.1 | 26.1 | 69.3 | 54.8 | 72.7 | 476.1 | 100 | 37.8 | 124.2 | 236.8 | 237.7 | 242.3 | * |
| 1 | -17.2 | 7.0 | 33.6 | 23.4 | 35.8 | 296.2 | 31 | -0.6 | 26.9 | 70.8 | 56.2 | 74.3 | 483.4 | 105 | 40.6 | 135.0 | 254.2 | 255.3 | 260.1 | * |
| 2 | -16.7 | 7.5 | 34.6 | 24.2 | 36.9 | 301.5 | 32 | 0.0 | 27.8 | 72.4 | 57.6 | 75.9 | 490.8 | 110 | 43.3 | 146.4 | 272.5 | 273.9 | 278.8 | * |
| 3 | -16.1 | 8.0 | 35.6 | 25.1 | 37.9 | 306.8 | 33 | 0.6 | 28.6 | 73.9 | 59.0 | 77.5 | 498.3 | 115 | 46.1 | 158.4 | 291.8 | 293.5 | 298.5 | * |
| 4 | -15.6 | 8.5 | 36.6 | 26.0 | 39.0 | 312.1 | 34 | 1.1 | 29.5 | 75.5 | 60.4 | 79.1 | 505.8 | 120 | 48.9 | 171.2 | 312.1 | 314.0 | 319.2 | * |
| 5 | -15.0 | 9.1 | 37.7 | 26.9 | 40.1 | 317.6 | 35 | 1.7 | 30.4 | 77.1 | 61.8 | 80.7 | 513.5 | 125 | 51.7 | 184.6 | 333.3 | 335.4 | 340.9 | * |
| 6 | -14.4 | 9.6 | 38.7 | 27.8 | 41.1 | 323.1 | 36 | 2.2 | 31.3 | 78.7 | 63.3 | 82.4 | 521.2 | 130 | 54.4 | 198.7 | 355.7 | 357.9 | 363.8 | * |
| 7 | -13.9 | 10.2 | 39.8 | 28.7 | 42.3 | 328.6 | 37 | 2.8 | 32.2 | 80.3 | 64.8 | 84.1 | 529.0 | 135 | 57.2 | 213.6 | 379.1 | 381.5 | 387.8 | * |
| 8 | -13.3 | 10.8 | 40.9 | 29.7 | 43.4 | 334.3 | 38 | 3.3 | 33.1 | 82.0 | 66.3 | 85.8 | 536.9 | 140 | 60.0 | 229.2 | 403.7 | 406.2 | 413.0 | * |
| 9 | -12.8 | 11.3 | 42.0 | 30.6 | 44.5 | 340.0 | 39 | 3.9 | 34.1 | 83.7 | 67.8 | 87.5 | 544.8 | 145 | 62.8 | 245.7 | 429.6 | 431.9 | 439.5 | * |
| 10 | -12.2 | 11.9 | 43.1 | 31.6 | 45.7 | 345.7 | 40 | 4.4 | 35.0 | 85.4 | 69.4 | 89.2 | 552.9 | 150 | 65.6 | 262.9 | 456.8 | 458.9 | 467.4 | * |
| 11 | -11.7 | 12.5 | 44.3 | 32.6 | 46.9 | 351.6 | 41 | 5.0 | 36.0 | 87.1 | 70.9 | 91.0 | 561.0 | 155 | 68.3 | 281.0 | 485.5 | 487.0 | 497.0 | * |

To determine **subcooling** for R-404A use BUBBLE POINT values (Temperatures above 50°F — Gray Background); to determine **superheat** for R-404A, use DEW POINT values (Temperatures 50°F and below).

** = exceeds critical temperature

What's Your Superheat?



MAKE A SYSTEMATIC ANALYSIS based on the complaint and measurements taken

Changing Parts Might Be The First Reaction
BUT...

1. May not be necessary and...
2. Does not always solve the problem

SUPERHEAT AND SUCTION PRESSURE
symptoms can provide the real cause



POSSIBLE CAUSES

1. Moisture, dirt, wax
2. Undersized valve
3. High superheat adjustment
4. Gas charge condensation
5. Dead thermostatic element charge
6. Wrong thermostatic charge
7. Evaporator pressure drop – no external equalizer
8. External equalizer location
9. Restricted or capped external equalizer
10. Low refrigerant charge
11. Liquid line vapor
 - a. Vertical lift
 - b. High friction loss
 - c. Long or small line
 - d. Plugged drier or strainer
12. Low pressure drop across valve
 - a. Same as #11 above
 - b. Undersized distributor nozzle or circuits
 - c. Low condensing temperature



POSSIBLE CAUSES

1. Oversized valve
2. TEV seat leak
3. Low superheat adjustment
4. Bulb installation
 - a. Poor thermal contact
 - b. Warm location
5. Wrong thermostatic charge
6. Bad Compressor – low capacity
7. Moisture, dirt, wax
8. Incorrectly located external equalizer



POSSIBLE CAUSES

1. Low load
 - a. Not enough air
 - b. Dirty air filters
 - c. Air too cold
 - d. Coil icing
2. Poor air distribution
3. Poor refrigerant distribution
4. Improper compressor-evaporator balance
5. Evaporator oil logged
6. Flow from one TEV affecting another's bulb