

RETORNO DE LIQUIDO - Solo durante el arranque



- Válvula sobredimensionada
- Fuga en asiento de VET (ciclo de apagado)
- Ajuste de recalentamiento bajo
- Carga termostática incorrecta
- Instalación del bulbo
 - Contacto térmico pobre
 - Ubicación en lugar caliente
- Fuga en válvula de descarga del compresor
- Fuga en asiento de la válvula solenoide
- Compresor ubicado en un lugar frío
- Línea de succión en lugar frío
- Evaporador drenando libremente hacia el compresor
- Evacuación del sistema interrumpida
- Ecuilizador externo obstruido o restringido

RECUERDE ESTOS PASOS

1RO Escuche la Queja



2DO Use Instrumentos Precisos



3RO Use Tarjetas Para Analizar

| TEMPERATURA DE EVAPORADOR (°C) | SALA DE TEMPERATURA - PRESION | | | |
|--------------------------------|-------------------------------|---------|-------------|---------|
| | TEMPERATURA | PRESION | TEMPERATURA | PRESION |
| 10 | 10 | 10 | 10 | 10 |
| 11 | 11 | 11 | 11 | 11 |
| 12 | 12 | 12 | 12 | 12 |
| 13 | 13 | 13 | 13 | 13 |
| 14 | 14 | 14 | 14 | 14 |
| 15 | 15 | 15 | 15 | 15 |
| 16 | 16 | 16 | 16 | 16 |
| 17 | 17 | 17 | 17 | 17 |
| 18 | 18 | 18 | 18 | 18 |
| 19 | 19 | 19 | 19 | 19 |
| 20 | 20 | 20 | 20 | 20 |
| 21 | 21 | 21 | 21 | 21 |
| 22 | 22 | 22 | 22 | 22 |
| 23 | 23 | 23 | 23 | 23 |
| 24 | 24 | 24 | 24 | 24 |
| 25 | 25 | 25 | 25 | 25 |
| 26 | 26 | 26 | 26 | 26 |
| 27 | 27 | 27 | 27 | 27 |
| 28 | 28 | 28 | 28 | 28 |
| 29 | 29 | 29 | 29 | 29 |
| 30 | 30 | 30 | 30 | 30 |

GUIAS GENERALES PARA AJUSTE DE RECALENTAMIENTO

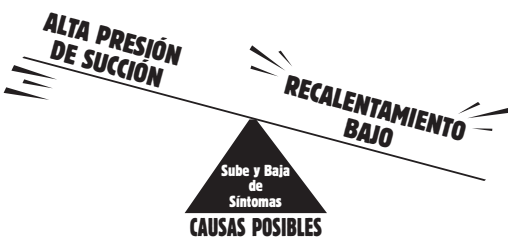
| APLICACION • | AIRE ACONDICIONADO Y BOMBAS DE CALOR | REFRIGERACION COMERCIAL | REFRIGERACION DE BAJA TEMPERATURA |
|------------------------------|--------------------------------------|--------------------------|-----------------------------------|
| TEMPERATURA DE EVAPORADOR °C | 10 a 5 (41°F a 50°F) | 5 a -20 (41°F a -4°F) | -20 a -40 (-4°F a -40°F) |
| AJUSTE DE RECALENTAMIENTO °C | 5 a 7 (8 a 12°F) | 3 a 5 (6 a 8°F) | 2 a 3 (4 a 6°F) |

Estos ajustes son solamente estimados para diseños de sistemas típicos, y deben usarse solo si no están disponibles los ajustes del fabricante del equipo.

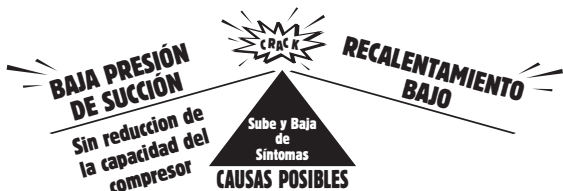
Consejos Para de Solución de Problemas



- Humedad, Basura, Cera.
- Válvula subdimensionada.
- Ajuste de recalentamiento alto.
- Migración de la carga del bulbo a la cabeza de la válvula.
- Elemento termostático sin carga.
- Carga termostática incorrecta.
- Caída de presión en el evaporador (válvula sin ecuilizador externo)
- Ubicación del ecuilizador externo.
- Ecuilizador externo obstruido o no conectado.
- Carga de refrigerante baja.
- Vapor en la línea de líquido
 - Ascenso vertical.
 - Caída por mucha fricción.
 - Línea larga o pequeña.
 - Filtro o malla obstruidos.
- Poca caída de presión a través de la válvula
 - Igual al #11 arriba.
 - Esprea o circuitos del distribuidor muy pequeños.
 - Baja temperatura de condensación.



- Válvula sobredimensionada.
- Fugas en el asiento de la VET.
- Ajuste de recalentamiento bajo.
- Instalación del bulbo
 - Contacto térmico pobre.
 - Ubicación en lugar caliente.
- Carga termostática incorrecta.
- Compresor dañado – baja capacidad.
- Humedad, suciedad, cera.
- Ecuilizador externo ubicado incorrectamente.



- Carga baja
 - No hay suficiente aire.
 - Filtros de aire sucios.
 - Aire demasiado frío.
 - Escarcha en el serpentín.
- Pobre distribución de aire.
- Pobre distribución de refrigerante.
- Balance compresor-evaporador inadecuado.
- Evaporador atascado con aceite.
- El flujo de una VET está afectando el bulbo de otra VET.

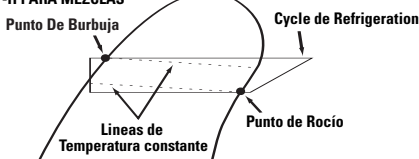
| °C | °F | REFRIGERANTE - psig | | | | | | |
|-----|-------|---------------------|--------|----------|---------|---------|----------|----------|
| | | 12 (F) | 22 (V) | 134a (J) | 502 (R) | 507 (P) | 404A (S) | 407C (N) |
| -50 | -58.0 | 18.4 | 10.9 | 21.1 | 5.9 | 4.5 | 5.5 | 15.1 |
| -48 | -54.4 | 17.1 | 8.8 | 20.0 | 3.4 | 1.8 | 3.0 | 13.4 |
| -46 | -50.8 | 15.8 | 6.6 | 18.9 | 0.8 | 0.5 | 0.2 | 11.5 |
| -44 | -47.2 | 14.3 | 4.2 | 17.6 | 1.0 | 2.1 | 1.3 | 9.5 |
| -42 | -43.6 | 12.7 | 1.6 | 16.2 | 2.5 | 3.7 | 2.9 | 7.2 |
| -40 | -40.0 | 11.0 | 0.6 | 14.7 | 4.1 | 5.5 | 4.6 | 4.8 |
| -38 | -36.4 | 9.1 | 2.0 | 13.0 | 5.8 | 7.4 | 6.4 | 2.2 |
| -36 | -32.8 | 7.2 | 3.6 | 11.2 | 7.7 | 9.4 | 8.3 | 0.3 |
| -34 | -29.2 | 5.0 | 5.3 | 9.3 | 9.7 | 11.6 | 10.4 | 1.8 |
| -32 | -25.6 | 2.7 | 7.1 | 7.2 | 11.8 | 13.9 | 12.6 | 3.4 |
| -30 | -22.0 | 0.3 | 9.1 | 4.9 | 14.0 | 16.4 | 15.0 | 5.2 |
| -28 | -18.4 | 1.1 | 11.1 | 2.4 | 16.4 | 19.0 | 17.5 | 7.0 |
| -26 | -14.8 | 2.5 | 13.4 | 0.1 | 18.9 | 21.8 | 20.1 | 9.0 |
| -24 | -11.2 | 4.0 | 15.7 | 1.5 | 21.6 | 24.8 | 23.0 | 11.2 |
| -22 | -7.6 | 5.5 | 18.2 | 3.0 | 24.5 | 28.0 | 26.0 | 13.5 |
| -20 | -4.0 | 7.2 | 20.9 | 4.6 | 27.5 | 31.3 | 29.2 | 15.9 |
| -19 | -2.2 | 8.0 | 22.3 | 5.4 | 29.1 | 33.0 | 30.9 | 17.2 |
| -18 | -0.4 | 8.9 | 23.7 | 6.3 | 30.7 | 34.8 | 32.6 | 18.6 |
| -17 | 1.4 | 9.8 | 25.2 | 7.2 | 32.4 | 36.7 | 34.3 | 19.9 |
| -16 | 3.2 | 10.8 | 26.7 | 8.1 | 34.1 | 38.5 | 36.2 | 21.4 |
| -15 | 5.0 | 11.8 | 28.3 | 9.1 | 35.9 | 40.5 | 38.0 | 22.8 |
| -14 | 6.8 | 12.8 | 29.9 | 10.1 | 37.7 | 42.5 | 39.9 | 24.3 |
| -13 | 8.6 | 13.8 | 31.5 | 11.1 | 39.5 | 44.5 | 41.9 | 25.9 |
| -12 | 10.4 | 14.8 | 33.2 | 12.2 | 41.4 | 46.6 | 43.9 | 27.5 |
| -11 | 12.2 | 15.9 | 35.0 | 13.3 | 43.4 | 48.8 | 46.0 | 29.1 |
| -10 | 14.0 | 17.0 | 36.8 | 14.4 | 45.4 | 51.0 | 48.1 | 30.9 |
| -9 | 15.8 | 18.2 | 38.6 | 15.6 | 47.5 | 53.3 | 50.3 | 32.6 |
| -8 | 17.6 | 19.4 | 40.5 | 16.8 | 49.6 | 55.6 | 52.6 | 34.4 |
| -7 | 19.4 | 20.6 | 42.5 | 18.0 | 51.7 | 58.0 | 54.9 | 36.3 |
| -6 | 21.2 | 21.8 | 44.4 | 19.3 | 53.9 | 60.4 | 57.3 | 38.2 |
| -5 | 23.0 | 23.1 | 46.5 | 20.6 | 56.2 | 62.9 | 59.7 | 40.2 |
| -4 | 24.8 | 24.4 | 48.6 | 22.0 | 58.5 | 65.5 | 62.2 | 42.2 |
| -3 | 26.6 | 25.8 | 50.8 | 23.4 | 60.9 | 68.1 | 64.7 | 44.3 |
| -2 | 28.4 | 27.1 | 53.0 | 24.8 | 63.4 | 70.8 | 67.3 | 46.4 |
| -1 | 30.2 | 28.6 | 55.2 | 26.3 | 65.9 | 73.6 | 70.0 | 48.6 |
| 0 | 32.0 | 30.0 | 57.5 | 27.8 | 68.4 | 76.4 | 72.7 | 50.9 |
| 1 | 33.8 | 31.5 | 59.9 | 29.3 | 71.0 | 79.3 | 75.5 | 53.2 |
| 2 | 35.6 | 33.0 | 62.4 | 30.9 | 73.7 | 82.3 | 78.4 | 55.6 |
| 3 | 37.4 | 34.6 | 64.9 | 32.6 | 76.5 | 85.3 | 81.4 | 58.0 |
| 4 | 39.2 | 36.2 | 67.4 | 34.3 | 79.3 | 88.4 | 84.4 | 60.5 |
| 5 | 41.0 | 37.8 | 70.0 | 36.0 | 82.1 | 91.6 | 87.4 | 63.1 |
| 6 | 42.8 | 39.5 | 72.7 | 37.8 | 85.1 | 94.8 | 90.6 | 65.8 |
| 7 | 44.6 | 41.2 | 75.5 | 39.6 | 88.1 | 98.1 | 93.8 | 68.5 |
| 8 | 46.4 | 43.0 | 78.3 | 41.5 | 91.1 | 101.5 | 97.1 | 71.3 |
| 9 | 48.2 | 44.8 | 81.2 | 43.4 | 94.2 | 105.0 | 100.5 | 74.1 |
| 10 | 50.0 | 46.6 | 84.1 | 45.4 | 97.4 | 108.6 | 105.5 | 96.4 |
| 11 | 51.8 | 48.5 | 87.1 | 47.5 | 100.7 | 112.2 | 109.1 | 99.8 |
| 12 | 53.6 | 50.4 | 90.2 | 49.5 | 104.0 | 115.9 | 112.7 | 103.3 |
| 13 | 55.4 | 52.4 | 93.3 | 51.7 | 107.4 | 119.7 | 116.4 | 106.8 |
| 14 | 57.2 | 54.4 | 96.5 | 53.9 | 110.9 | 123.6 | 120.2 | 110.4 |
| 15 | 59.0 | 56.5 | 99.8 | 56.1 | 114.4 | 127.5 | 124.1 | 114.1 |
| 16 | 60.8 | 58.6 | 103.2 | 58.4 | 118.0 | 131.6 | 128.0 | 117.9 |
| 17 | 62.6 | 60.7 | 106.6 | 60.8 | 121.7 | 135.7 | 132.1 | 121.7 |
| 18 | 64.4 | 62.9 | 110.1 | 63.2 | 125.5 | 139.9 | 136.2 | 125.7 |
| 19 | 66.2 | 65.2 | 113.7 | 65.7 | 129.3 | 144.2 | 140.4 | 129.7 |
| 20 | 68.0 | 67.5 | 117.3 | 68.2 | 133.2 | 148.6 | 144.7 | 133.8 |
| 21 | 69.8 | 69.8 | 121.1 | 70.8 | 137.2 | 153.1 | 149.1 | 138.0 |
| 22 | 71.6 | 72.2 | 124.9 | 73.5 | 141.2 | 157.7 | 153.5 | 142.3 |
| 23 | 73.4 | 74.6 | 128.8 | 76.2 | 145.4 | 162.3 | 158.1 | 146.6 |
| 24 | 75.2 | 77.1 | 132.7 | 78.9 | 149.6 | 167.1 | 162.8 | 151.1 |
| 25 | 77.0 | 79.7 | 136.8 | 81.8 | 153.9 | 172.0 | 167.5 | 155.7 |
| 26 | 78.8 | 82.3 | 140.9 | 84.7 | 158.3 | 176.9 | 172.3 | 160.3 |
| 27 | 80.6 | 84.9 | 145.1 | 87.7 | 162.7 | 182.0 | 177.3 | 165.0 |
| 28 | 82.4 | 87.6 | 149.4 | 90.7 | 167.3 | 187.2 | 182.3 | 169.9 |
| 29 | 84.2 | 90.4 | 153.8 | 93.8 | 171.9 | 192.5 | 187.4 | 174.8 |
| 30 | 86.0 | 93.2 | 158.2 | 97.0 | 176.6 | 197.8 | 192.7 | 179.8 |
| 31 | 87.8 | 96.0 | 162.8 | 100.2 | 181.4 | 203.3 | 198.0 | 184.9 |
| 32 | 89.6 | 98.9 | 167.4 | 103.6 | 186.3 | 208.9 | 203.4 | 190.2 |
| 33 | 91.4 | 101.9 | 172.1 | 106.9 | 191.2 | 214.6 | 209.0 | 195.5 |
| 34 | 93.2 | 104.9 | 177.0 | 110.4 | 196.3 | 220.5 | 214.6 | 200.9 |
| 35 | 95.0 | 108.0 | 181.9 | 113.9 | 201.4 | 226.4 | 220.4 | 206.4 |
| 36 | 96.8 | 111.2 | 186.9 | 117.5 | 206.7 | 232.5 | 226.2 | 212.0 |
| 37 | 98.6 | 114.4 | 192.0 | 121.2 | 212.0 | 238.6 | 232.2 | 217.8 |
| 38 | 100.4 | 117.7 | 197.1 | 125.0 | 217.4 | 244.9 | 238.3 | 223.6 |
| 39 | 102.2 | 121.0 | 202.4 | 128.8 | 222.9 | 251.4 | 244.4 | 229.5 |
| 40 | 104.0 | 124.4 | 207.8 | 132.7 | 228.5 | 257.9 | 250.7 | 235.6 |
| 41 | 105.8 | 127.8 | 213.3 | 136.7 | 234.2 | 264.6 | 257.2 | 241.7 |
| 42 | 107.6 | 131.3 | 218.9 | 140.8 | 240.0 | 271.4 | 263.7 | 248.0 |
| 43 | 109.4 | 134.9 | 224.5 | 144.9 | 245.9 | 278.3 | 270.3 | 254.4 |
| 44 | 111.2 | 138.5 | 230.3 | 149.2 | 251.9 | 285.4 | 277.1 | 260.9 |
| 45 | 113.0 | 142.2 | 236.2 | 153.5 | 258.0 | 292.6 | 284.0 | 267.5 |
| 46 | 114.8 | 146.0 | 242.2 | 157.9 | 264.2 | 299.9 | 291.0 | 274.2 |
| 47 | 116.6 | 149.8 | 248.3 | 162.4 | 270.5 | 307.4 | 298.1 | 281.0 |
| 48 | 118.4 | 153.7 | 254.5 | 167.0 | 276.9 | 315.0 | 305.3 | 288.0 |
| 49 | 120.2 | 157.7 | 260.8 | 171.7 | 283.4 | 322.8 | 312.7 | 295.0 |
| 50 | 122.0 | 161.7 | 267.2 | 176.4 | 290.1 | 330.7 | 320.2 | 302.2 |
| 52 | 125.6 | 170.0 | 280.3 | 186.2 | 303.6 | 347.0 | 335.6 | 317.0 |
| 54 | 129.2 | 178.6 | 293.9 | 196.4 | 317.7 | 364.0 | 351.5 | 332.2 |
| 56 | 132.8 | 187.4 | 307.9 | 206.9 | 332.2 | 381.5 | 368.0 | 347.9 |
| 58 | 136.4 | 196.6 | 322.5 | 217.8 | 347.1 | 399.8 | 385.0 | 364.2 |
| 60 | 140.0 | 206.0 | 337.5 | 229.2 | 362.6 | 418.7 | 402.6 | 380.9 |
| 62 | 143.6 | 215.7 | 353.0 | 240.9 | 378.6 | 438.4 | 420.8 | 398.2 |
| 64 | 147.2 | 225.8 | 369.0 | 253.1 | 395.1 | 458.8 | 439.5 | 416.1 |
| 66 | 150.8 | 236.2 | 385.5 | 265.7 | 412.2 | 480.1 | 458.9 | 434.5 |
| 68 | 154.4 | 246.9 | 402.5 | 278.7 | 429.9 | 502.1 | 479.4 | 453.4 |
| 70 | 158.0 | 257.9 | 420.1 | 292.2 | 448.2 | 524.9 | 500.8 | 472.9 |
| 72 | 161.6 | 269.3 | 438.2 | 306.2 | 467.2 | ** | 523.2 | 493.1 |
| 74 | 165.2 | 281.0 | 456.9 | 320.7 | 486.9 | ** | ** | 513.7 |

** Excede la temperatura crítica.

PRESION - Libras por pulgada cuadrada

VACIO - Pulgadas de mercurio - letras itálicas

DIAGRAMA P-H PARA MEZCLAS



Para determinar el subenfriamiento en las mezclas de refrigerantes usa el punto (líquido) de Burbuja (valores en Azul)

Para determinar el recalentamiento en las mezclas de refrigerantes usa el punto (vapor) de rocío (valores en Negro)