Pressure Control Settings

1. Pump Down Every Cycle (A solenoid is used to evacuate the evaporator at the end of each cycle.)
   - Cut – Out set at 5 psig (To prevent atmosphere from being pulled into if a leak develops.)
   - Cut – In set at Fixture Temperature minus 5 psig (To allow compressor start before evaporator coil fills with refrigerant.)

2. No Pump Down
   - Cut – Out set at Evaporative Temperature minus 2ºF (To stop compressor at a temperature 2ºF below desired fixture temperature.)
   - Cut – In set at Fixture Temperature plus 2ºF (To start compressor at a temperature just above desired fixture temperature.)

Evaporator Temperature / Pressure

(Convert Evaporator Temperature to pressure using Pressure Temperature Conversion Chart)

1. Air Conditioning Application = Fixture Temperature minus 40ºF = Evaporator Temperature. (Room Temperature 80ºF to 70ºF)
2. Medium Temperature Refrigeration = Fixture Temperature minus 20ºF = Evaporator Temperature. (Vegetable, Fruits, etc., 60ºF to 40ºF)
3. Medium Temperature Refrigeration = Fixture Temperature minus 15ºF = Evaporator Temperature (Soda, Dairy, Beverage, some meats, etc., 35ºF to 34ºF)
4. Low Temperature Refrigeration = Fixture Temperature minus 10ºF = Evaporator Temperature (Ice Cream, Frozen meats, etc., 0ºF and below)

Different applications have different temperatures. There are many systems that operate in the Medium and Low temperature applications using a 15ºF difference from fixture to evaporator. You must be familiar with the equipment you are servicing and always check with the manufacturer’s data sheets.

Superheat Calculation(s)

(The amount of refrigeration effect left after the refrigerant leaves the evaporator coil)

1. Measure the suction (return) pressure leaving the evaporator, and convert to temperature using a pressure temperature chart for the system refrigerant.
2. Measure the actual suction temperature leaving the evaporator.
3. Subtract the Converted Temperature / Pressure from the actual suction line temperature. The product is the system superheat.

\[
\text{Actual Suction Line Temperature} - \frac{\text{Converted Pressure/Temperature}}{\text{Superheat Temperature}}
\]
Pressure Control Settings

Low Pressure switch setting for an R-12 general-purpose walk-in cooler **without pump down** (temperature controlled by a pressure switch.) Assume a 40-degree fixture temperature and a 20-degree TD between the fixture and the evaporative temperature.

- Box Temperature = 40ºF (Fixture Temperature)
- Refrigerant Temperature = (40ºF - 20ºF) = 20ºF (Saturated Suction Pressure)

  During the off cycle, when the box reaches approximately 42ºF, (2ºF above the ‘fixture set point’) the saturated suction pressure in the evaporative coil will be **39 psig** for R-12. (Cut – In setting, starting the compressor.)

  During the operation of the compressor, the refrigerant pressure in the evaporator will come to approximately 22.5 psig. (with a 42ºF fixture – 20ºF TD = a saturated suction temperature of 22ºF.)

  When the box temperature reaches 38ºF, (2ºF below the ‘fixture set point’) the saturated suction temperature in the evaporative coil will be 18ºF during compressor operation and the saturated suction pressure will be **19 psig**. (Cut – Out setting stopping the compressor.)

- Cut In = 39 psig
- Cut Out = 19 psig
- Diff. = 10 psig

Low Pressure switch setting for an R-502, low temperature system **with pump down.** Assume a 0ºF fixture, (freezer.) Box temperature controlled by a thermostat in the fixture.

- Box Temperature = 0ºF (Fixture Temperature)
- Refrigerant Temperature = (0ºF - 10ºF) = -10ºF (Saturated Suctions Pressure)

  During the operation of the compressor, the saturated suction pressure in the evaporator coil would be approximately 22.5 psig. (with a 0ºF box – 10ºF TD = a refrigerant temperature of -10ºF.)

  With PUMP DOWN, the compressor is controlled by the low-pressure control, and the thermostat opens and closes the solenoid valve that stops the flow of refrigerant. When the thermostat is ‘satisfied’ and the solenoid valve closes, the flow of refrigerant stops, and the compressor continues to run evacuating the evaporative coil, the suction line, and the suction accumulator. You would set the **CUT OUT** setting of the low-pressure control at **5 psig**, so the compressor stops before going into a vacuum.

  The CUT IN setting is set 5 psig below the NORMAL OPERATING saturated suction pressure of the evaporator coil. Here, the normal operating saturated suction pressure is 22.5 psig (see above), so you’d set the low pressure **CUT IN** at **17.5 psig**.

- Cut In = 18 psig
- Cut Out = 5 psig
- Diff. = 13 psig

**High Pressure Control Settings**

All refrigeration applications using the outdoor ambient air to cool the condenser, the maximum settings would be 150ºF condensing.

R-12 = 234 psig;  R-502 = 400 psig;  R-22 = 381psig