# Understanding Chiller Refrigeration Tons and Chiller Terminology

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# Understanding Chiller Refrigeration Tons

The process of cooling is called refrigeration, which can be measure in tons.

A water chiller refrigeration ton is defined as:

1 Refrigeration Ton (RT) = 1 Ton - 12000 BTUH/h = 200 Btu/min = 3025.9k Calories/h = 12661 kJ/h = 3.517 kW

1kW = 0.2843 Refrigeration Tons (RT)

A ton is the amount of heat removed by an air conditioning system that would melt 1 ton (2000 lbs) of ice in 24 hours. The heat required to melt 1lb of ice at 32°F to water is 144 Btu.

1 Ton Refrigeration = (2000 lb) (144 Btu/lb)/24 = 12000 Btu/hr

| Btu/h | Refrigeration Ton | kW |
|---|---|---|
| 6000 | 1/2 | 1.76 |
| 12000 | 1 | 3.52 |
| 18000 | 1 1/2 | 5.28 |
| 24000 | 2 | 7.03 |
| 30000 | 2 1/2 | 8.79 |
| 36000 | 3 | 10.6 |
| 42000 | 3 1/2 | 12.3 |
| 48000 | 4 | 14.1 |
| 54000 | 4 1/2 | 15.8 |
| 60000 | 5 | 17.6 |

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# Understanding Chiller Terminology

| | |
|---|---|
| **Air-Cooled** | Chiller system that uses the ambient air surrounding the condensing unit to cool and condense the refrigerant back in to a liquid |
| **BTU** | British Thermal Unit (BTU) is a unit of measure often used to describe chiller capacity A single BTU is the amount of energy required to raise one pound of water one degree F. |
| **Central Chiller** | A chiller used to cool several processes. The chiller can be air-cooled, water-cooled, portable or stationary. |
| **Chiller** | A refrigeration system using halocarbon or ammonia refrigerants that cool industrial process equipment by using the evaporation of a refrigerant to cool the fluid through a heat exchanger. |
| **Compressor** | Compresses cool low pressure refrigerant gas to hot high pressure refrigerant gas that is then condensed back in to a liquid |
| **Glycol** | Typically added to the water in a chiller to prevent freezing. Available as Ethylene Glycol or Propylene Glycol can be purchased with or without rust inhibitors. |
| **Hot Gas Bypass** | A valve that bypasses a portion of the hot gas leaving the refrigeration compressor. The bypassed gas does not enter the condneser and is reintroduced into the circuit after the expansion valve and before the evaporator. |
| **Industrial Chiller** | Term used to describe chillers used for industrial process cooling versus comfort applications where the heat load and leaving fluid temperatures may be different. |
| **Low Ambient Kit Chiller** | A modification which permits proper chiller operation in low ambient conditions. The type and number of modifications depends on the chiller, refrigerant and the various temperatures. |
| **Low Temp (LT) Chiller** | Typically designed to operate below 20°F leaving fluid temperature. |
| **Portable Chiller** | A chiller that includes both the refrigeration circuit (pump and tank) within the same footprint. |
| **Refrigerant** | The substance (usually with a low boiling temperature)used to cool the water in a chiller through either a heat exchanger or an evaporator. |
| **Refrigeration Unit or Refigeration Ciruit** | All of the components needed to evaporate and condense a refrigerant |
| **Reservoir/Tank** | A required vessel for most process cooling applications. With closed-loop systems, the internal tank helps maintain cold water temperature and prevents temperature spikes from occurring. |
| **Reverse Flow** | Portable water chiller without a tank. Used in open loop cooling applications where an external tank is used and gravity feeds the chiller pump sending water through the chiller and filter then back to the process or back to the external tank |
| **Standard Flow** | Portable water chiller with a tank. Used in closed loop cooling applications where all of the water pump from the chiller returns to the machines under pressure generated byt he chiller pump. |
| **Water-Cooled** | Absorb heat from process water and transfers the heat to a separate source such as a cooling tower. Water-cooled chillers require condenser water treatment to eliminate mineral buildup which create poor heat transfer and reduce chiller efficiency. |

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