Condenser Misting System
by
Energy Support Services, Inc.

Increases cooling capacity while lowering demand and energy usage in air-cooled refrigeration and air conditioning systems

PRODUCT INFORMATION

Target Applications

- Retrofits for undersize condensers
- Peak demand shaving applications
- Load curtailment applications
- Retail, commercial, industrial and government buildings

Benefits

- Increases system cooling capacity
- Reduces kW and kWh
- Extends compressor life
- Reduces system downtime
- Minimizes product losses
- Requires minimal maintenance
- Improves occupant comfort levels

The Problem

The temperature of the air used to carry away heat from air-cooled condensers and packaged air conditioning units greatly impacts the performance of the system. As the temperature of the air rises, head pressures also rise. As a result, cooling capacity falls while electrical demand (kW) and energy usage (kWh) increase. These problems are exacerbated when condensers are installed on rooftops where temperatures may exceed original design conditions by 50°F or more.

In response to insufficient cooling capacity issues, building owners are forced to purchase larger cooling systems or wet the condenser coils with garden sprinklers to increase cooling capacity through evaporative cooling. Having to purchase larger systems is an expensive alternative, especially when capacity problems only arise when the ambient temperature exceeds the original design. The other alternative, wetting the condenser coils with a garden sprinkler, can indeed increase cooling capacity. However, since no water controls are used, the sprinkler is typically left to run when it is no longer needed. As a result, a great deal of water is wasted, water and sewerage costs skyrocket, and the water that is not evaporated can shorten equipment life and cause leaking problems on the roof.

The Solution

Energy Support Service's patent pending Condenser Misting System is a cost-effective, sensible solution to capacity and energy usage issues that occur during upper ambient temperatures. By injecting a fine water mist into the condenser air, the temperature is reduced and the condenser is able to reject significantly more heat. This reduces the head pressure and compression ratio, so electrical demand (kW) and usage (kWh) are reduced and cooling capacity is increased. Furthermore,these benefits are realized exactly when they are needed, when the load on the system created by high ambient temperatures exceeds the system's cooling capability. And the higher the ambient temperature, the better the performance of the Condenser Misting system.

The Condenser Misting System is a simple, elegant, measurable solution. With no moving parts to malfunction, it is safe, dependable, and requires little maintenance. Furthermore, the cost of the Condenser Misting System is quickly recovered through reduced demand charges, energy usage, water and sewerage usage, and the ability to participate in electric utility company load curtailment programs.

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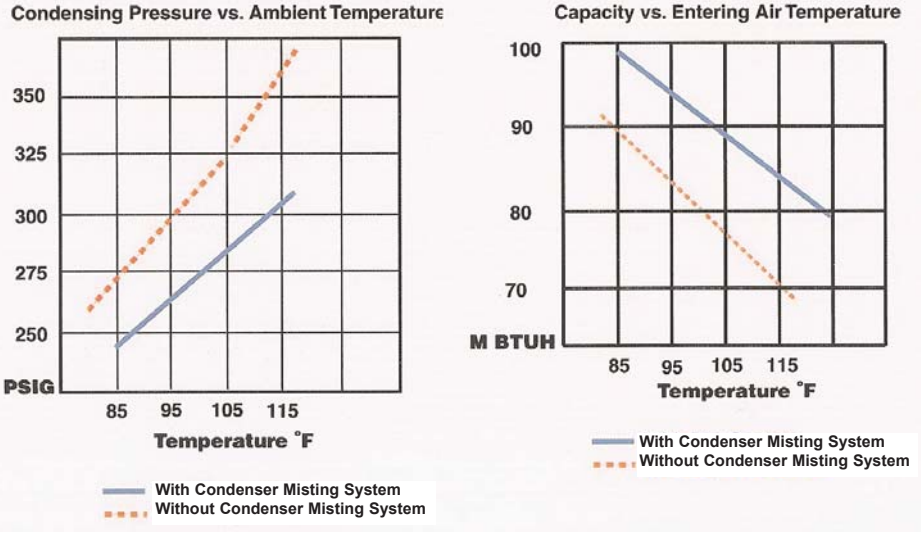
How The Condenser Misting System Works

Condenser Misting Systems are made up of carefully selected misting nozzles connected by copper piping and configured specifically for each system. This configuration is critical to proper system operation since too much mist will cause water to collect on the roof, while too little will limit system performance. Central to the operation of the system is the control arrangement. The misting nozzles are assured a constant pressure through use of a pressure regulating valve. One solenoid valve tied into the condenser fan contactor or building energy management system, and another tied into a temperature sensor, enable the misting system to be shut off when it is not needed. Nozzle selection and configuration ensure that the maximum cooling effect is achieved and that the mist is evaporated into the air stream rather than being carried onto the coil. The use of quick disconnect fittings allows nozzles to be quickly changed and greatly simplifies nozzle cleaning.

Design Considerations

The sizing of the Condenser Misting System is based on the cooling unit tonnage, the CFM of air entering the condenser, the geographic location, and the desired outcome. If, for example, the Condenser Misting System is to be installed on a 100-ton air cooled condenser in Los Angeles, and the desired outcome is to approach wet bulb conditions, then the number, spacing, and placement of the nozzles will be engineered accordingly. If, however, it is to be installed on a 50-ton packaged air conditioning system in Boston, and the desired outcome is to reach 50% of the difference between dry bulb and wet bulb temperatures, less water will be required and different selection criteria will be used.



As ambient temperatures rise, head pressures and energy use increase as well, and cooling capacities fall. By misting the air prior to the condenser coil, head pressures, energy usage, and demand are lowered, and cooling capacity is increased.

General Applications

Problem solving: When condensers are undersized, particularly on design days, Condenser Misting Systems can add capacity and eliminate the need to replace or supplement existing systems or wet the condenser coil with a garden sprinkler. As head pressures are lowered, refrigerant condensing temperatures are reduced. This increases system cooling capacity and reduces energy use by satisfying the load and allowing compressors to unload or cycle off.

Demand Reduction and Energy Conservation: When applied to existing units, Condenser Misting Systems allow condensers to reject additional heat, which is particularly important during upper ambient temperatures. As a result, head pressures are lowered and compression ratios (head pressure/suction pressure) are reduced. This allows compressors to draw less energy when they run, which reduces demand (kW). At the same time, energy usage (kWh) is lowered.

For additional information on the Condenser Misting System, please contact:

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