FLUID COOLING SYSTEMS, LLC.

SOLUTIONS

# COST SAVINGS FREE-COOLING APPROACHES

## FREE COOLING APPROACHES

Free Cooling is a fast and effective, economic method of utilizing low external air temperatures. It can be used to assist in cooling water for industrial temperature control applications or in HVAC systems.

In many parts of the country a cooling system can use cooler outdoor temperatures to cool a facility or process, without the use of additional equipment or actual mechanical cooling. This is known as free cooling, and there are many factors that can affect the type and amount of free cooling provided. These factors include temperature, humidity, time of day, the amount of cooling needed.

## CHILLER EVAPORATOR TO TOWER WATER

One of the most common methods to benefit from free cooling comes from chiller applications. Heat exchangers transfer heat between the cooling tower water and the chilled water. When the temperature of the water from the cooling tower is colder than the desired chilled water temperature, compressors can be staged off and automatic valves in the chiller water and refrigerant circuits can control the new flow path.

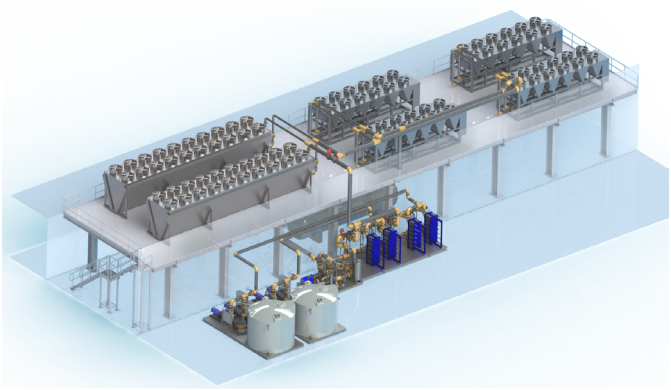
## THERMO-SIPHON FREE-COOLING

Natural refrigerant free cooling is achievable because refrigerant vapor migrates to the area with the lowest temperature. For free-cooling, refrigerant boils in the evaporator because of the warm water flowing through the tubes, and the vapor migrates naturally to the cold condenser. After the refrigerant condenses, it flows by gravity back to the evaporator and condenser without the need to operate the compressor.

Depending on the application, it is possible for refrigerant migration in a centrifugal chiller to satisfy many hours of cooling load without operating the compressor. Free cooling chillers serving systems that can tolerate warmer chilled water temperatures at part load conditions can produce over 60% of the rated capacity without compressor operation.

## FREE-COOLING from DRY COOLERS

The use of Free Cooling in an industrial temperature control application may differ from an environmental cooling solution. An example is that fresh ambient air cannot be drawn straight into the cooling circuit. Therefore, to harness the benefits of the low ambient temperatures a Free Cooling coil is introduced into the circuit. Depending on the application, this free-cooling system may require a plate and frame heat exchanger and a closed-circuit glycol loop. Systems can be designed for TRIM cooling in addition to FREE cooling.



A Free Cooling fan coil system is installed in series with the chiller system's evaporator so in lower ambient conditions, partial or 100%, Free Cooling can be achieved. This method of operation, depending on the ambient temperatures can produce a reduction in energy costs of up to 70%. As the ambient air temperature drops at least a degree below the process return water temperature, the benefits of Free Cooling can begin to be realized and the external ambient temperature can begin to cool a process in place of a chiller. As the ambient temperature drops 3°C to 5°C below the required process supply water temperature total Free Cooling can be achieved taking over from the chillers' compressors 100% and consequently providing an environmentally friendly and cost-effective approach to process and HVAC cooling. When using a centrifugal compressor-based chiller, using the Free-Cooler systems trim cooling capabilities reduces the lift to the centrifugal circuit, thereby saving chiller energy.