Appendix M-2

Water Efficiency Memorandum

Kimley»Horn

DFWCGI

September 4, 2024

Data Center Water Use
Air-Cooled Chiller Systems

To whom it may concern,

This memorandum summarizes the water consumption associated with the proposed cooling system that would likely be used for the data center on Saturn Drive in the City of Monterey Park. While many datacenters have leveraged mechanical heat rejection systems that operate with evaporative technologies to cool the datacenter processes, that is not the approach being utilized at this site. Instead, to reduce water demand, we have proposed a system that consumes negligible water, as our focus has been a blend of energy efficiency and environmental sustainably.

We have proposed to utilize air cooled chillers with a free-cooling heat-exchanger. This approach will allow the facility to simply circulate water in a closed piping loop. The design and technology requires minimal water and is summarized as follows: Water would be required to initially fill the system before operational start up. Once filled, the only time additional water would be required for the systems would be if there was ever a pipe leak (unlikely as the piping system will be fully welded). As the system operates, the air-cooled chillers will run their compressors to cool the water when the outside air temperatures are warmer, and would use a fee cooling heat exchanger to allow them to operate without a compressor when temperatures are cooler. Overall, this type of system is well-tested and water-efficient for datacenter cooling especially in drier, more arid climates.

We have attached a manufacturer summary of the of the proposed air-cooled chillers with integrated water-side economizer for further reference, if needed.

Respectfully,

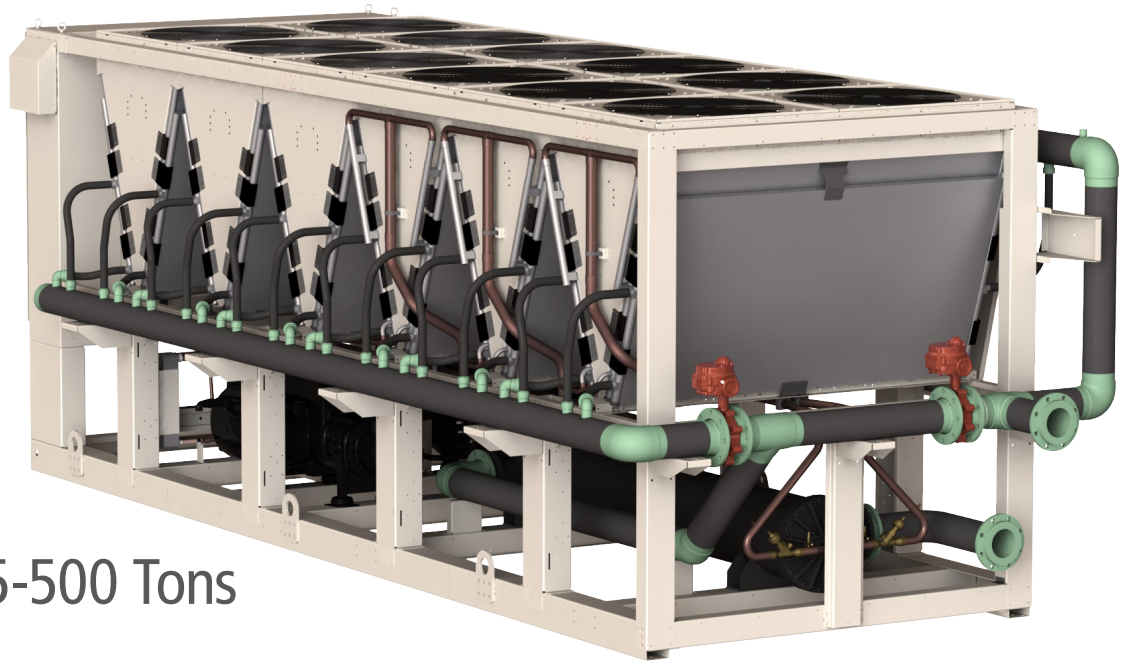
Curtis C. Spraggins
California Mechanical PE 41851



DAIKIN



Pathfinder® Air-cooled Chillers with Integrated Water-side Economizer



175-500 Tons

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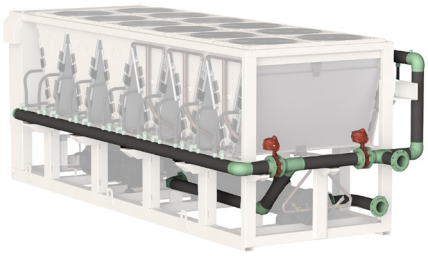
Integrated Water-side Economizer Solutions

The integrated water-side economizer (WSE) option (sometimes referred to as "Free Cooling" in the industry) adds a fluid-to-air heat exchanger coil in series with the chiller refrigerant condenser coil. The heat rejection airflow moves across both coils, allowing heat rejection and chilled fluid cooling without the need for vapor compression when outdoor air temperatures are lower than the cooling fluid temperature. **Daikin's WSE technology is the only HVAC factory packaged solution that combines the benefits of an integrated water-side economizer with VVR® (variable volume ratio) compression technology and total unit configurability, offering solutions fully tailored to the application requirement.**

For building load profiles where there is a cooling demand and ambient temperatures are below the design chilled fluid temperature, an integrated WSE allows that demand to be met using much less power than normal vapor compression mechanical cooling. This can offer substantial cost of operation benefits to the building owner. Having the coils integrated into the chiller instead of using a separate dry cooler allows for economizing without the need for additional footprint and uses the same fans and fan motors already on the chiller, saving cost and space. It also reduces the number of electrical and piping connections needed, lowering install cost. Having the mechanical portion and controls portion bundled into one piece of equipment helps ensure plug-and-play operation, reduces the chance of field control issues, and allows the chiller to optimize efficiency and first cost.

WSE Benefits



- Low friction lowers pressure drop
- Low weight reduces roof load
- Impervious to corrosion for outstanding cleanliness
- UV protected for longevity

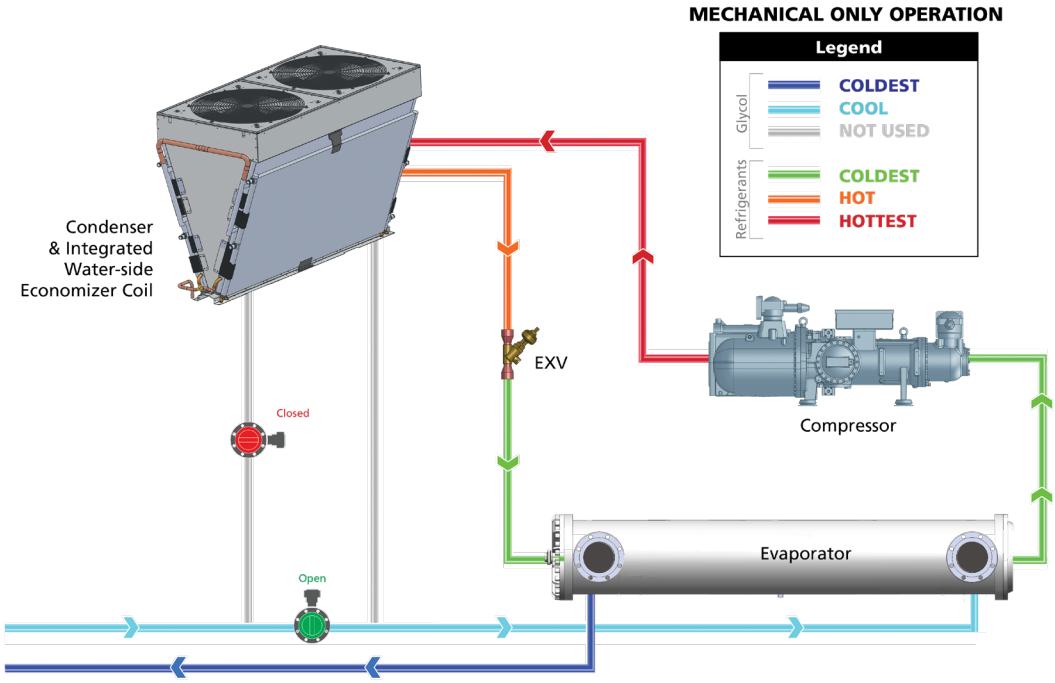
Polypropylene Header Pipe



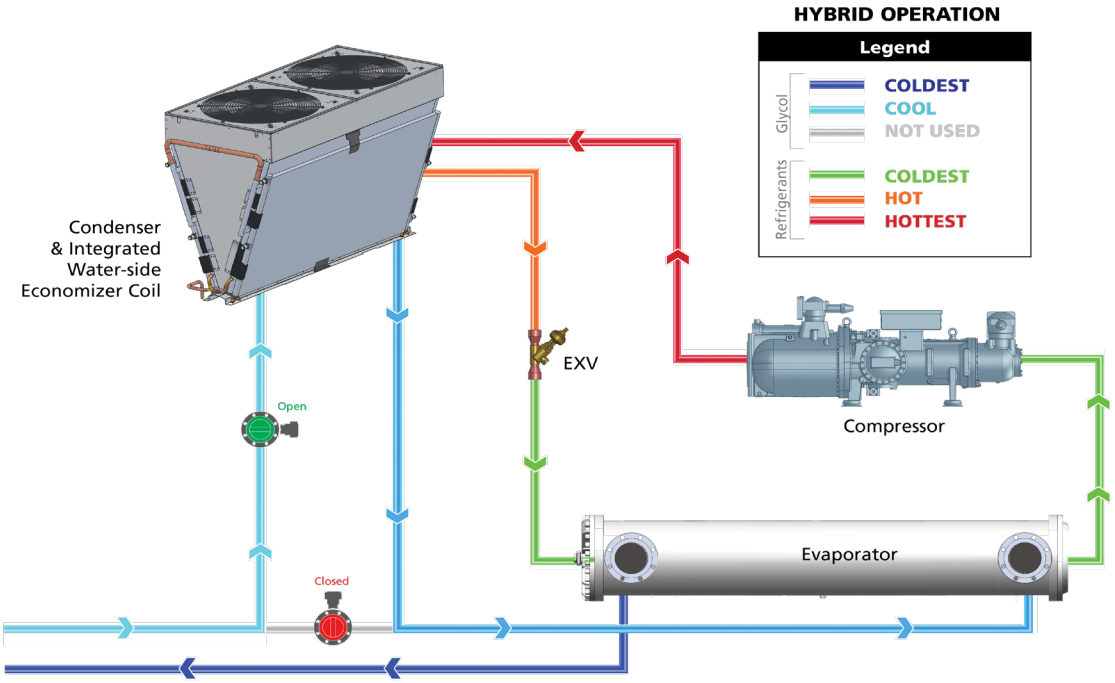
- Maximize free cooling run hours for best performance and payback
- Easily cleanable
- Lower air pressure drop reduces fan energy use

Microchannel Fluid Coils

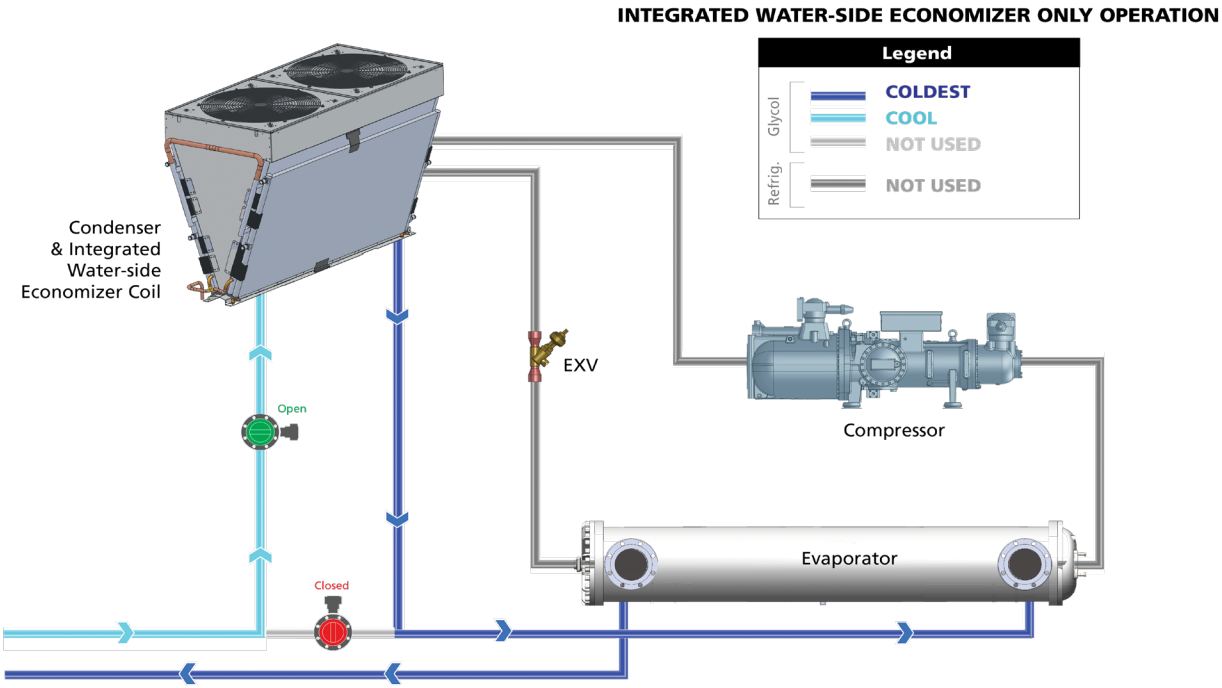
Operating Modes



Mechanical Cooling Only – This mode operates like a normal chiller with compressors and refrigerant used to remove the heat from the building. Mechanical cooling is used where ambient temperature is above the loop water temperature. 2-way valves bypass the water/glycol mixture around the WSE cooling coils so that they are not in the loop and do not contribute to the pressure drop of the system.



Hybrid – In this mode, both mechanical and WSE cooling are engaged. The 2-way valves direct the water/glycol mixture through the WSE coils first, allowing the cool ambient air to remove some of the heat from the loop. The water/glycol mixture then flows through the evaporator where the remaining heat load is removed. Hybrid mode allows you to get some benefit from the WSE coils even when it isn't cold enough to achieve removal of 100% of the load with the WSE coils only.



WSE Only – When ambient temperature is lower than the water/glycol temperature, the chiller will disengage the compressors and all of the load will be rejected by the WSE coils. The water/glycol mixture continues to flow through both the WSE coils and the evaporator so that if the load can no longer be met by just the WSE coils, the compressors will be enabled and switch back into hybrid mode. The colder the ambient temperature, the greater the amount of heat a given coil can reject. During WSE mode, the only power draw is from the operation of the condenser fans and water pump.

Unmatched Technologies

VVR® (Variable Volume Ratio) Technology

VVR compressor technology adjusts the chiller compression ratio and rpm using a VFD to meet partial load demands and varying outdoor ambient conditions at optimized efficiency levels.

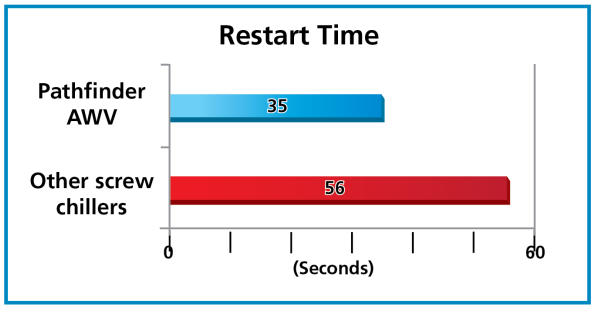
- Ideal for applications/data centers where load and ambient temperature can vary greatly
- High leaving water temperatures (up to 70°F LWT) enable higher efficiency performance
- Uitmate system efficiency when combining VVR and WSE technologies



VVR®

RapidRestore® Technology

With compressor start and loading times that are twice as fast as standard HVAC units, Daikin air-cooled chillers with RapidRestore technology give building owners and facility managers peace of mind during a critical power loss.



- RapidRestore restarts the chiller in as little as 35 seconds after power is restored
- A Fast Loading™ option restores full load cooling capacity in less than five minutes
- Simplifies ownership by decreasing the need for additional thermal storage for critical applications

SiteLine™ Building Controls

Daikin makes building automation simpler, more effective and easier to scale than any other controls solution on the market today.

SITELINE™
DAIKIN BUILDING CONTROLS

- Easy installation with out-of-the box functionality for both new and retrofit applications
- Simple operation that brings insight to system performance and is intuitive to manage
- Low upfront costs that enable you to work with other equipment systems
- Scalable solutions for both standalone equipment and building systems
- Advanced security that protects customer data



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