



DriSteem system reclaims water from air handlers while it humidifies and cools a data center

RESULTS

- Maintains constant minimum humidity levels in a 130,000-square-foot server room with 35-foot ceilings
- Reduces the building's cooling load by over 200 tons at peak demand
- Reprocesses drain water from air handlers while producing no wastewater

THE JOB

This data center* provides colocation services, where tenants pay for space and bandwidth and are guaranteed uninterrupted service and site conditions for their servers.

Aside from security, two of the most critical site conditions are temperature and humidity. How critical? So critical that tenants log temperature and humidity data in their server rows and may submit backcharges for hours or days when conditions are out of range, even if they did not lose data or connectivity.



THE CHALLENGE

The server room's enormous breadth and high ceiling present over 4.5 million cubic feet of indoor air that must meet guaranteed site conditions. This is accomplished with 21 air handlers — eleven on the rooftop and ten indoors. The rooftop air handlers, which do not include humidification, have economizers configured for 100 percent outdoor air at 55 °F. Outdoor temperatures at the data center location average 74 °F in the summer and 44 °F in the winter. The ten indoor air handlers circulate indoor air year round at a variable volume from 15,000 to 60,000 cubic feet per minute.

Because heat from the air is used for evaporation, high-pressure systems cool the air while humidifying.

The data center facility design team contacted Larry Bovich at Mechanical Technologies, DriSteem's rep for New York and New Jersey, with a challenge. Given a ten- by thirteen-foot cross section in each of four indoor air handlers, maintain minimum humidity levels in the data center year round with the following conditions:

- using 40 °F municipal water,
- with an atomizing system that will also provide evaporative cooling to offset server heat,
- at separately staged, 55 °F dispersion locations a short distance upstream from air filters,
- while reclaiming and re-processing atomized water that does not evaporate in the air handlers,
- all while communicating with the building management system via Modbus.

The challenge was accepted! "Their facility size, which is over two and half football fields, was not a problem for us, nor was the cooling requirement," recalls DriSteem senior application engineer Dave Schwaller. "Of greater concern was the limited evaporation distance in a cool airstream, which is not ideal for evaporation efficiency." Another

* The company name is withheld by request for security reasons.



Atomizing nozzles upstream from air filters



Air intake ends of the indoor air handlers

complicating factor was the up-to-one-hundred-percent outside air from the rooftop air handlers, which can cause huge swings in the humidification output needed to meet set point.

THE SOLUTION

"The reason we were willing to commit to this job is the size of our atomized water particles, the majority of which are 10 microns or less," explains Schwaller. "Even in cool air, that accelerates evaporation enough to meet set point and absorption requirements year round."

Schwaller and Bovich designed a turn-key system starting with DriSteem's dechlorination and duplex water softening systems for pretreatment, along with DriSteem's 400 Series RO water treatment system for up to 15,000 gallons per day of ultra-pure water. The RO system treats a combination of reclaimed water from the white tank shown below and pretreated water from the dechlorinator and softener. After RO treatment, the ultra-pure water is sent to an RO storage tank.

DriSteem's Model 5500 high-pressure pump station draws water from the RO storage tank and sends it through stainless steel tubing to the dispersion grids, where it is atomized at up to 1200 psi. The dispersion grids are separately staged and can simultaneously meet humidification demand in multiple zones with different set points. DriSteem systems are designed to communicate with BMS in multiple protocols, and this system is centrally monitored via Modbus, the language of the data center BMS.

DriSteem's high-pressure system has been cooling and humidifying this data center since its commissioning in late 2016.

DRI-STEEM Corporation

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Reclaim tank (far left) for water that does not evaporate in the air handlers

RESOURCES

For more information on DriSteem's evaporative cooling and humidification: [Evaporative cooling and humidification](#)

To register for DriCalc, DriSteem's free sizing and selection software: [Register for DriCalc](#)

For more information on finding your local DriSteem representative: [Find a rep](#)