

# CHILLER & COOLING BEST PRACTICES

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March 2017

## INDUSTRIAL COOLING SYSTEMS

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**16** Designing a Dedicated Modern Wine Cooling System

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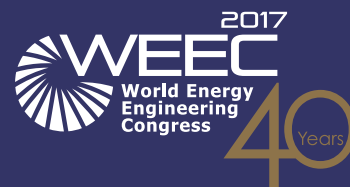
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## INDUSTRIAL COOLING SYSTEMS

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#### Ball Corporation Engineers a Reduction in Cooling Tower Load

By Chiller & Cooling Best Practices Magazine

### 16 Designing a Dedicated Modern Wine Cooling System

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# FROM THE EDITOR



We began the year by visiting AHR Expo 2017 in Las Vegas. The AHR Expo set several records, including attendance of more than 68,000 registered visitors and exhibitor personnel, as well as 500,159 square feet sold. The Show was by far the largest and best attended Expo in the Western states, with some 1,968 exhibiting companies. Exhibitors said they'd never seen so much traffic at AHR. Business optimism over 2017 prospects was palpable. There were some booths so full of people they were hard to get into. I spent two full days visiting the booths of cooling tower and central chiller plant manufacturers. I hope you enjoy the Show Report.

A "Best Practice" we look for is how can plants reduce the load on their cooling towers? Thanks to our Editorial Board Member Doug Barndt, from Ball Corporation, we were able to speak with a member of his "Energy Team" at their Saratoga Springs (NY) aluminum can manufacturing plant. Engineering Manager Bob Nelson described how they used a heat exchanger to create a 10°F reduction in the temperature of water returning to the cooling tower. This helped an "almost maxed-out" closed-loop cooling system circulating water through air compressors, compressed air dryers, vacuum pumps, decorator inkers and various other heat exchangers.

Keven Trowhill, from Century Refrigeration, has sent us an article about how only custom-designed chillers can optimize wine production. "Cooling systems must meet three main criteria in order to be effective in wine production and storage applications: the cooling systems must be able to achieve the ideal temperatures for wine production processes; they must deliver consistent, reliable operation; and they must be well-designed for safe, convenient use."

Data Centers have become major energy and water consumers. Douglas Bougher and Kent Martens, from SPX Cooling Technologies, write about how some have incorrectly questioned the use of cooling towers vs. dry systems. They state, "In evaluating the best cooling strategy for a data center, it is critical to view water usage holistically, including water use where the power is made. When viewed in this light, mechanical evaporative cooling systems are often far more efficient than alternative dry systems."

Thank you for investing your time and efforts into *Chiller & Cooling Best Practices*.

## ROD SMITH

Editor

tel: 412-980-9901

rod@airbestpractices.com

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## 2017 MEDIA PARTNERS





# RESOURCES FOR ENERGY ENGINEERS

## CHILLER & COOLING TOWER TECHNOLOGY PICKS

### Trane Announces Series R® RTWD Water-Cooled Chiller for Commercial and Industrial Buildings

Trane®, a leading global provider of indoor comfort solutions and services and a brand of Ingersoll Rand, is announcing that its Series R® RTWD water-cooled chiller for commercial and industrial buildings is now available for customers in North America and the Middle East who are ready to transition to systems with lower global warming potential (GWP).

The Series R RTWD chiller, available in 80-250 tons, delivers energy efficiency coupled with ease of installation, application flexibility and high reliability. These chillers can operate with a choice of R-134A or Opteon™ XP10 (R-513A), a next-generation, low-GWP refrigerant from Chemours. With an infinite unloading compressor design, wide operating temperature range, heat-recovery options up to 140 degrees Fahrenheit, advanced controls and high efficiencies, these chillers can be the perfect choice for tight temperature control in almost any application.

“Trane continues to innovate its chiller portfolio by offering customers the most energy and operationally efficient system choices for their buildings,” said Manlio Valdes, Vice President of product management and marketing at Trane. “The Series R RTWD is reliable, safe and efficient while offering customers the added benefit of sustainability now and in the future.”

The Series R RTWD chiller joins the Ingersoll Rand EcoWise™ portfolio of products, which are designed to lower environmental impact with next-generation, low-GWP refrigerants and high efficiency operation. Other Trane chillers included in the EcoWise portfolio are CenTraVac™ centrifugal chillers, Trane Sintesis™ air-cooled chillers and Trane Series E™ CenTraVac for Europe and the Middle East. EcoWise products:

- Are available with next-generation, lower-GWP refrigerants
- Reduce greenhouse gas (GHG) emissions



*Series R® RTWD water-cooled chiller for commercial and industrial buildings.*

- Maintain safety and energy efficiency through innovative design
- Meet or exceed emissions regulations

### The Ingersoll Rand Climate Commitment

Ingersoll Rand, a world leader in creating comfortable, sustainable and efficient environments, made a Climate Commitment to reduce GHG emissions from its products and operations by 2030. The Ingersoll Rand Climate Commitment pledges to:



## RESOURCES FOR ENERGY ENGINEERS

### CHILLER & COOLING TOWER TECHNOLOGY PICKS

- Cut the refrigerant GHG footprint of its products by 50 percent by 2020 and incorporate lower-GWP alternatives across its portfolio by 2030;
- Invest \$500 million in product-related research and development by 2020 to fund the long-term reduction of GHG emissions; and
- Reduce company operations-related GHG emissions by 35 percent by 2020.

To date, the Climate Commitment has supported the avoidance of approximately 2 million metric tons of CO<sub>2</sub>e globally, which is the equivalent of avoiding annual CO<sub>2</sub> emissions from energy used in more than 270,000 homes or more than 2.1 billion pounds of coal burned. By 2030, the company expects to reduce its carbon footprint by 50 million metric tons.

#### About Ingersoll Rand and Trane

Ingersoll Rand advances the quality of life by creating comfortable, sustainable and efficient environments. Our people and our family of brands — including Club Car®, Ingersoll Rand®, Thermo King® and Trane® — work together to enhance the quality and comfort of air in homes and buildings; transport and protect food and perishables; and increase industrial productivity and efficiency. We are a \$13 billion global business committed to a world of sustainable progress and enduring results. Trane solutions optimize indoor environments with a broad portfolio of energy efficient heating, ventilating and air

conditioning systems, building and contracting services, parts support and advanced control.

**For more information, visit [www.ingersollrand.com](http://www.ingersollrand.com) or [www.trane.com](http://www.trane.com).**

**To learn more about the Climate Commitment, visit [www.Trane.com/EcoWise](http://www.Trane.com/EcoWise).**

#### New Marley® NC Everest™ Cooling Tower Provides Up To 50% More Cooling Capacity

SPX Cooling Technologies, Inc., a full-line, full-service industry leader in the design and manufacture of evaporative and air-cooled heat exchangers, announces the new Marley NC Everest Cooling Tower, a crossflow evaporative cooling system that provides up to 50% more cooling capacity than any other single-cell, factory-assembled cooling tower.

In addition to unmatched cooling capacity, the NC Everest uses up to 35% less fan power to achieve higher energy savings.



*The new Marley® NC Everest™ Cooling Tower Provides Up To 50% More Cooling Capacity and 35% Less Fan Power Per Cell*

Its unique design minimizes piping and electrical connections to reduce installation costs. Seven-foot doors provide access to the tower's interior service decks and mechanical components, making routine inspections and maintenance safer and easier.

Featuring the new, patent-pending MarKey™ Drift Eliminators, the NC Everest Cooling Tower achieves the lowest measureable drift rate, down to 0.0005 percent of circulating water flow, so less water escapes the tower.

NC Everest Cooling Tower sound levels have been independently verified per CTI ATC-128 test code by third-party CTI-licensed test agents and certified acoustical engineers. SPX Cooling Technologies' Marley brand is the only package tower subjected to this rigorous independent sound testing.

For more information about the Marley NC Everest Cooling Tower, visit <http://spxcooling.com/nceverest>.

#### About SPX Cooling Technologies, Inc.:

SPX Cooling Technologies, Inc. is a leading global manufacturer of cooling towers, evaporative fluid coolers, evaporative condensers and air cooled heat exchangers providing full-service cooling solutions and support to customers in the power generation, petrochemical, industrial, refrigeration, and heating, ventilation and air conditioning (HVAC) markets for more than 100 years.

**For more information, please visit [www.spxcooling.com](http://www.spxcooling.com). SPX Cooling Technologies and its product brands are part of SPX Corporation.**



## CHILLER & COOLING TOWER TECHNOLOGY PICKS

### RAE Coils Manufacturing Replacement Evaporative Condensing Tube Bundles

RAE Coils, a division of RAE Corporation, an industry leader in the design and production of engineered heating, cooling, and refrigeration systems, announces that it is manufacturing replacement and OEM evaporative condensing tube bundles. The tube bundles are a critical component of the highly efficient condensing units originally manufactured by Mammoth's Ultraline and Penthouse brands. When compared with air cooled technology, this innovative product can result in a reduction of up to 35% in annual operating costs.

Evaporative condensing units cool more efficiently than air-cooled units because the surface of the refrigerant tubes is sprayed with water, thereby allowing the tube bundles to reject more heat than in an air-cooled system with the same surface area and airflow. The increased efficiency of the evaporative-cooled unit results in decreased energy usage and operational costs.

The tubes in RAE Coils' evaporative cooling tube bundles are constructed from copper to provide optimal heat transfer. Evaporative condensing units with RAE Coils' evaporative condensing tube bundles are ideal for use in commercial applications, such as hospitals, universities, industrial buildings, and more.

### About RAE Corporation

RAE Corporation, family-owned and headquartered in Pryor, Oklahoma, is an industry leader in the design and



RAE Coils announces it is manufacturing replacement and OEM evaporative condensing tube bundles.

manufacture of custom-engineered and off-the-shelf cooling and refrigeration systems. RAE's expertise allows the company to design top-quality systems to meet the specific needs of their customers. RAE designs and manufactures products in four divisions: Century Refrigeration, RAE Coils, Refrigeration Systems and Technical Systems.

***For more information,  
visit [www.RAECorp.com](http://www.RAECorp.com).***

An advertisement for CTA fluid chillers. The top half features the text "YOUR SOLUTION" in large white letters on a dark background, followed by "State of the art fluid chillers to optimize your process cooling systems" in white text on an orange background. Below this, there is a photograph of several large industrial fluid chillers of different sizes, arranged on a green lawn under a blue sky with clouds. At the bottom left is the CTA North America logo, and at the bottom right is the contact information: "Charlotte, NC USA", "www.cta-na.com", and "980-259-6650".

## RESOURCES FOR ENERGY ENGINEERS

## CHILLER &amp; COOLING TOWER TECHNOLOGY PICKS

**2017 AHR Expo Innovation Awards Ceremony**

A highlight of the 2017 Air-Conditioning, Heating, Refrigerating Exposition (AHR Expo), held January 30 to February 1 in Las Vegas, is the 2017 AHR Expo Innovation Awards ceremony.

The 2017 AHR Expo Innovation Awards honor the most inventive and original products, systems and technologies showcased at this year's Show in the categories of: building automation; cooling; green building; heating; indoor air quality; plumbing; refrigeration; software; tools & instruments; and ventilation.

All 2017 AHR Expo Innovation Award winners have been selected by a panel of third-party ASHRAE member judges who evaluated each entry based on innovative design, creativity, application, value and market impact.

"The innovative and creative product development demonstrated by this year's Award winners has served to confirm the HVACR Industry's ongoing vitality and forward thinking. It is exciting to see all the emerging technologies that are bringing about better and better solutions to the challenges we face," said Clay Stevens, President of International Exposition Company.

"We congratulate those who have been recognized as 2017's pioneers from across all areas of the industry, by proving there is always more to be achieved, and farther to be propelled, when it comes to HVACR

innovation," Stevens continued. "This is the spirit that makes each year's competition so fresh and exciting, and is what we are proud to see, year after year, as a cornerstone of inspiration for the HVACR industry's ongoing creativity and advancement."

The complete list of 2017 AHR Expo Innovation Award winners includes:

**Building Automation**

*Company:* Danfoss ([www.danfoss.us](http://www.danfoss.us); 2017 AHR Expo booth No. C4506)

*Innovation:* Danfoss Enterprise Services

**Cooling**

*Company:* Daikin Applied ([www.daikinapplied.com](http://www.daikinapplied.com); 2017 AHR Expo booth No. C2509)

*Innovation:* Pathfinder® Air-cooled Screw Chillers with Variable Volume Ratio (VVR) Technology

**Green Building**

*Company:* Carrier ([carrier.com/commercial](http://carrier.com/commercial); 2017 AHR Expo booth No. C1510)

*Innovation:* Dual Stage Relief Economizer (DSRE)

**Heating**

*Company:* Noritz America ([www.noritz.com](http://www.noritz.com); 2017 AHR Expo booth No. C5917)

*Innovation:* Noritz CB Combi Boiler

**Indoor Air Quality**

*Company:* Nortec Humidity ([www.humidity.com](http://www.humidity.com); 2017 AHR Expo booth No. C4706)

*Innovation:* Nortec GS Series - CS Model (Nortec GS CS) Humidifier

**Plumbing**

*Company:* Taco, Inc. ([www.tacomcomfort.com](http://www.tacomcomfort.com); 2017 AHR Expo booth No. N7926)

*Innovation:* SmartPlug Smart Hot Water Recirculation Control

**Refrigeration**

*Company:* Danfoss ([www.danfoss.us](http://www.danfoss.us); 2017 AHR Expo booth No. C4506)

*Innovation:* Danfoss CTM (Electrical Controlled Transcritical Multi Ejector)

**Software**

*Company:* Nidec Motor Corporation / U.S. MOTORS® ([www.usmotors.com](http://www.usmotors.com); 2017 AHR Expo booth No. C3924)

*Innovation:* Rescue Select Programming App

**Tools & Instruments**

*Company:* PEXOLOGY, Inc. ([www.pexgun.com](http://www.pexgun.com); 2017 AHR Expo booth No. C6618)

*Innovation:* PEXGUN



## CHILLER &amp; COOLING TOWER TECHNOLOGY PICKS

**Ventilation**

**Company:** Titus ([www.titus-hvac.com](http://www.titus-hvac.com);  
2017 AHR Expo booth No.  
C3137)

**Innovation:** Helios Digital Diffuser

**About AHR Expo**

The International Air-Conditioning, Heating, Refrigerating Exposition (AHR Expo), which began more than 85 years ago as a heating and ventilation show, has now grown into one of the world's largest HVACR events. The Exposition is held annually in key markets and major cities across the U.S., hosting close to 2,000 exhibitors and bringing in crowds of 60,000 industry professionals. The Show provides a unique forum for the HVACR community to come together and share new products, technologies, and ideas. The event is co-sponsored by ASHRAE and AHRI, and is held concurrently with ASHRAE's Winter Conference.

**About International Exposition Company, Inc. (IEC)**

International Exposition Company (IEC) is a Westport, Conn.-based trade show management company. For more than 100 years, the company has built its reputation on a track record of honesty, respect and fairness for exhibiting companies and show attendees. IEC owns and manages three major trade show events; the annual AHR Expo (International Air-Conditioning, Heating, Refrigerating Exposition), the biennial AHR Expo-Mexico, and the biennial Chem Show. Across the three events, attendance totals in excess of 70,000.

**For more information on the 2017 AHR Expo, visit [abrexpo.com](http://abrexpo.com)**

**Denso's Corrosion Prevention on Cooling Towers**

Recently Hines, a large real estate developer, acquired the rights to the Wedge Tower in downtown Houston, TX. After inspection, it was concluded that the cooling tower would have to be rebuilt and the piping replaced due to corrosion. Due to past successes experienced with Denso on numerous cooling towers over the years, the decision was made to use the Denso Petrolatum Tape System to provide long-term corrosion protection on all of the piping, valves, flanges, etc.

After a short on-site training session with a Denso representative, the contractor, MFR Fluid & Air, was able to install the Denso Petrolatum Tape system quickly and easily. The scope of work consisted of minimal surface preparation (SSPC SP-2/SSPC SP-3), followed by the application of a thin layer of Denso Paste S105, Densyl Tape with a 55% overlap, and a protective layer of HDPE Outerwrap with SmartBand Strapping. For irregular areas such as flanges and valves, the Denso Profiling Mastic was also applied to provide a smooth profile to tape over and then top coated with the Denso Weathershield 15 in place of the HDPE Outerwrap. Another successful application



Overview of the complete Denso corrosion protection system for cooling towers for pipes, valves and fittings.

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### CHILLER & COOLING TOWER TECHNOLOGY PICKS



*The Cooling Tower at Wedge Tower.*

gave the developer and contractor confidence that the life of their cooling tower piping will be extended while preventing corrosion for many years to come.

#### About Denso North America

Denso North America Inc. is a subsidiary of Winn & Coales International, a leading manufacturer of anti-corrosion coatings that include Protal liquid epoxies, Denso petrolatum tapes, mastics, primers, bitumen tapes, butyl tapes, hot applied tapes, and a full line of marine pile protection systems. Winn & Coales was originally established as

a business in London, England, in 1883, and the first petrolatum tape manufactured in the UK was Denso tape, manufactured under license by Winn & Coales (Denso) Limited. Denso tape was developed over 80 years ago for the "Long Life Protection" of buried steel pipelines against corrosion. The Denso SeaShield Marine Systems include fiberglass forms, epoxy grouts, underwater epoxies, injectable epoxies, petrolatum tape wrap systems and much more.

***For more information, visit at [www.densona.com](http://www.densona.com) or call +1-888-821-2300.***

#### Embraco Launches Toolbox Application for Contractors

Embraco, a world leader in innovation and one of the largest manufacturers of hermetic compressors for refrigeration, recently launched the Embraco Toolbox, a digital application that combines several unique features to provide support for contractors. Embraco has always been attentive to new developments in the digital world, and not only offers innovative solutions through its products, but also provides leading services for industry professionals to support them with their day-to-day responsibilities.

The Embraco Toolbox App is the company's latest offering to make the contractor's work easier. "The application reaffirms our technological leadership and allows us to further strengthen our relationship with contractors and partners," shared Guilherme de Almeida, Marketing Manager, Embraco.

Available in all countries and in more than 10 languages, the Embraco Toolbox App has seven features to help facilitate the contractors' day-to-day business. The features include: a search tool for the nearest distributor, the Embraco product catalog, a cross-reference product guide, unit converter, refrigerant ruler, a tool to identify causes of the main cooling system problems, as well as all Refrigeration Club content.



## CHILLER & COOLING TOWER TECHNOLOGY PICKS

The application's launch will ensure access to practical and efficient information and it can be accessed, at first, via smartphones with iOS and Android operating systems, available for download in the App Store and Play Store. A version for tablets will be available later this year.

### New website for the Refrigeration Club

The Refrigeration Club ([www.refrigerationclub.com](http://www.refrigerationclub.com)), the segment's main information website, has a new look and many new features. One of them is the interactive forum, a space dedicated to contractors for exchanging information and sharing experiences.

"With the redesign, users can download exclusive materials, consult the training and lecture schedules and also print a Club membership card," added Almeida.

The new features complement existing sections that provide exclusive information on topics including technical explanations and tutorials on marketing, sales and sustainability.

With over 50,000 visits per month, Refrigeration Club has become a resource for industry news and best practices. "With the latest updates, we plan to further expand the number of users and continue to build trust in the Embraco brand and quality of our products and services," concluded Almeida.

### Product Selection Software

The Product Selection Software replaces the electronic catalog and assists customers in selecting the most appropriate solutions for different refrigeration systems, providing more independence for contractors, retailers and manufacturers.

The tool makes it possible to search for a solution that best fits the intended application's parameters. The user just needs to enter the necessary characteristics, such as size or cooling capacity and the desired operating condition. It's also possible to filter by refrigerant, voltage, efficiency and other criteria. After selecting the search, the user can even simulate the compressor's behavior in the operating condition that he wants, which can be any standard norm as well as a custom condition. The software can also be downloaded so that it can be used without an Internet connection.

### About Embraco

Embraco is a multinational manufacturer in the sector of hermetic compressors for refrigeration focused on innovation. The compressor is the main component responsible for producing cold in the refrigeration system. With global operations and an annual production capacity of 40 million units, Embraco offers solutions that are differentiated for their innovation and low energy consumption. Its more than 11,000 employees work in factories and offices located in Brazil (headquarters in Joinville, Santa Catarina, Brazil), China, Italy, Slovakia, Mexico, United States and Russia.

*For more information,  
visit [www.embraco.com](http://www.embraco.com).*

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# Ball Corporation Engineers a REDUCTION IN COOLING TOWER LOAD

By Chiller & Cooling Best Practices Magazine

► If you enjoy the occasional beverage from an aluminum can, there's a decent chance the can was made by Ball Corporation, a container manufacturing giant with facilities across the world. The company's facility in



*Ball Corporation is an active participant in the Environmental Protection Agency's ENERGY STAR program.*

Saratoga Springs, New York, services beverage companies throughout the northeastern United States. The plant operates four production lines producing millions of aluminum cans per day.

Ball's Saratoga Springs plant has a long track record of improving energy efficiency. It is also an active participant in the Environmental Protection Agency's ENERGY STAR® program. A recent project involved the engineering team implementing a heat recovery project. This involved using a heat exchanger to simultaneously reduce the load on the cooling tower and hot water heaters.

Ball's heat recovery project serves as a great example of clever energy engineering and taking advantage of synergies between the support equipment within a manufacturing plant (i.e. air compressors, vacuum pumps, cooling towers, etc.). The team at Chiller & Cooling Best Practices Magazine spoke with Bob Nelson, Engineering Manager at Ball Corporation's Saratoga Springs facility, to find out more about the heat recovery project and to learn how it impacted the plant's overall energy spend.



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## BALL CORPORATION ENGINEERS A REDUCTION IN COOLING TOWER LOAD

### Closed-Loop Cooling System Nears Capacity

The Saratoga Springs plant has a closed-loop cooling system circulating water through air compressors, air dryers, a vacuum pump, decorator inkers, and various other heat exchangers. The cooling system removes heat created during various manufacturing processes. Hot water is transferred to a cooling tower, placing significant demand on the tower. During periods of high humidity — with ambient temperatures in the upper 80s — the temperature of the cooling water returning from the tower reaches 90°F. During those design-day conditions, the system can experience heat pump drop-outs, air compressor inefficiencies, and compressed air dryers faulting due to high temperatures.

“We have an Evapco closed-loop cooling tower, and we were right at the capacity of that cooling tower in the summer time, around August, when it’s humid and it’s hot,” Nelson told us. “Our heat pump system in the offices would sometimes kick out, and once in a blue moon we’d get to the point where one of our pieces of support equipment — like an air compressor — would want to kick out on high temp.”



Obviously, Nelson wanted to ensure the comfort of the employees working in the offices. However, if an air compressor went down, production stopped, making it even more important to either replace the cooling tower, or reduce its load.

The machinery on the cooling loop includes a vacuum pump and various other heat exchangers for process equipment, such as “inkers.” Compressed air equipment puts a large demand on the cooling loop. Approximately 50 percent of the load on the cooling loop comes from the two compressed air systems at Ball’s Saratoga Springs plant. The major machinery in those systems includes two air compressors and two refrigerated air dryers, each of which is water-cooled.

### Heat Recovery Project Reduces Load on Cooling Tower

With so much depending on the cooling loop, the cooling tower’s capacity needed improvement. However, the capital expenditure for increased cooling tower capacity would have been expensive. Instead of replacing the tower, the engineering team at Ball Corporation carefully evaluated other options. Conveniently, another Ball plant was divesting itself of a heat exchanger, which Nelson creatively put to use at the Saratoga Springs plant.

“I didn’t want to spend a lot of money to expand the cooling tower capacity,” Nelson explained. “One of our sister plants was putting in some cooling towers, and they had an Alfa Laval heat exchanger they were not going to use anymore.” Incoming makeup water from the city system is typically 55 degrees Fahrenheit. The team set up pipes to transport this water to the new heat exchanger and installed temperature and pressure gauges. Using this heat exchanger has resulted in a 10°F reduction in the temperature of water returning to the cooling tower.

Reducing the cooling tower load has had a number of other benefits. The cooling tower’s two 25-hp fans can now run at lower speeds, and the makeup water needed for the evaporation process has been reduced.



**“The fans are running at a lower speed, and the makeup water volume is down. More importantly, in the summer time when there’s the max load on the cooling tower, we’re not at the max capacity on the tower, so our office heat pumps aren’t kicking out.”**

**— Bob Nelson, Engineering Manager at Ball Corporation’s Saratoga Springs facility**





"The fans are running at a lower speed, and the makeup water volume is down," Nelson told us. "More importantly, in the summer time when there's the max load on the cooling tower, we're not at the max capacity on the tower, so our office heat pumps aren't kicking out."

The heat recovery project has also yielded other benefits. The heat generated inside the heat exchanger is used to pre-heat the incoming water to certain production applications requiring heated water. This has reduced the natural gas consumption of the boilers.

### Cleverly Engineered Energy-Saving Installations

The engineers at Ball Corporation achieved energy savings with a heat exchanger, lowering demand on a hot water heaters and the cooling tower simultaneously. The cleverly engineered system has also improved the efficiency of the compressed air system, as it is now receiving cooler chilled water.

"When I go through the math, it all kind of checks," Nelson said. "There are efficiency losses, but I can honestly say we're taking significant BTUs an hour out of the cooling tower, and significant BTUs out of our natural gas demand for heat. All while improving the efficiency of our cooling tower, so I didn't have to spend money on buying a new one."

With a heat exchanger procured from another facility, the only additional costs included piping and freight costs. The engineers at Ball expect to hit an excellent ROI target. Also important to note, the ambient conditions of the office building next door are no longer impacted by the dog days of summer. **BP**

To read more about Sustainability at Ball Corporation, visit [www.ball.com/sustainability](http://www.ball.com/sustainability)

To read more about **Heat Recovery Projects** visit  
[www.coolingbestpractices.com/system-assessments/heat-recovery](http://www.coolingbestpractices.com/system-assessments/heat-recovery)

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Tim Dugan is the President of Compression Engineering Corporation.

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Steve Bruno is a Product Marketing Manager for Atlas Copco.

Our second **Sponsor Speaker** is Pascal van Putten, CEO of VPI Instruments. His presentation is titled, "Air Flow Consumption Fingerprint." The "consumption fingerprint" is a different approach to selecting the right air compressor configuration, based on flow measurements and statistical histogram data. He will show the value of histograms in optimization projects.



Pascal van Putten is the CEO of VPI Instruments

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# Designing a Dedicated Modern WINE COOLING SYSTEMS

By Kevin Trowhill, Vice President,  
Century Refrigeration

► The temperature of wine must be kept stable throughout its production and storage in order to ensure final product quality that is acceptable for distribution and sale, and so cooling systems are an integral component of wine production. In wineries, the entire harvest can be destroyed by a temperature fluctuation during processing or storage, leading to catastrophic consequences for wineries.

Cooling systems must meet three main criteria in order to be effective in wine production and storage applications: the cooling systems must be able to achieve the ideal temperatures for wine production processes; they must deliver consistent, reliable operation; and they must be well-designed for safe, convenient use. Mass produced commercial cooling systems cannot achieve all of these criteria. Only state-of-the-art cooling

systems designed specifically for the wine industry are capable of meeting these needs and therefore protecting wineries' harvests, year after year.

## Achieving Ideal Temperatures

One of the primary factors in the design of a highly effective wine cooling system is that the system must be capable of achieving the necessary temperature for wine production. In the case of red wine production, the propylene glycol solution is used in tank cooling jackets that must remain at 35°F for the duration of the cooling process. In white wine production, the glycol solution must first be kept at 35°F for the initial cooling process, and then lowered to 20°F for the



cold stabilization phase of processing. Cold stabilization is critical to achieving clear wines; without successful cold stabilization, wine can become cloudy and unusable.

In either case, the chiller in question must be able to supply glycol temperatures far below the range of standard mass produced commercial chillers and mechanically operate regardless of ambient temperature. A chiller's compressor will normally operate 10°F below the desired glycol temperature in order to achieve optimum glycol temperature. Most commercial chillers' compressors are designed to run at 35°F and produce water cooled to 45°F. Dedicated wine cooling systems' compressors are designed to operate reliably in the 10-25°F SST range, in order to achieve the necessary glycol temperatures of 20°F and 35°F described above.

Some cooling systems, such as the Century Refrigeration N-Series Chiller, are designed specifically for wine production, and therefore are able to achieve these temperatures far below the operating range of generic commercial cooling systems. Achieving the correct temperature goes hand-in-hand with the next important aspect of a successful cooling system for wine applications: reliability.

### Consistent, Reliable Operation

It is not enough that cooling systems used in wineries must be able to achieve the necessary cooling temperatures: they must be able to do so consistently throughout the harvest season and through their lifetime. A number of features of cooling systems contribute to their overall reliability, including protection from catastrophic failures, design for energy efficiency, and ability to handle a wide range of operating conditions.

The systems must be built to protect themselves from catastrophic failure in order to avoid risk of damaging significant portions of a harvest. The N-Series Chillers, for example, can be easily reset in the event of certain failures, and can be built with multiple compressors or circuits, suction accumulators and replaceable core suction filters provides added redundancy and reliable system design.

The N-Series Chiller systems are also built to maximize energy efficiency throughout the system lifetime, which further improves reliability. The air-cooled coils by Century Refrigeration feature 12 fins per inch, in comparison to mass produced commercial systems' 22-24 fins per inch. At 12 fins per inch, the coils can be washed out



*The Century Refrigeration N-Series Chiller is designed specifically for wine production*

## DESIGNING A DEDICATED MODERN WINE COOLING SYSTEMS

with water or compressed air to keep the coil clean and functioning at top capacity throughout the life of the equipment. At 22-24 fins per inch, the coil acts like a filter, trapping dirt and debris as time goes on. These coils are extremely difficult to clean, and lose capacity over their lifetime.

Workload and ambient temperatures can also strongly impact the reliability of the cooling systems'. The load being placed on a winery's cooling system varies greatly throughout the harvest season, and so systems that are designed specifically for use in wineries must be capable of maintaining temperature regardless of the load by varying cooling as needed. These systems are also capable of operating in a far greater (30 degrees to in excess of 115 degree ambient) range of ambient temperatures than commercial-grade chillers. Since commercial chillers are designed to cool only to a lower extreme of about 45°F, they are often incapable of handling ambient temperatures anywhere below about 40°F without modification. Wine process-specific chillers, on the other hand, need to achieve glycol temperatures of 35°F year-round, and so they are capable of functioning reliably in ambient temperatures far below 40°F.

### Design for End Use

The third and final key criterion for an effective cooling system for wine processing applications is an appropriate design for end use. This means that the cooling system must be designed for food-safe operation and must be easy to install and maintain. Cooling systems for wine processing applications must be able to use inhibited food-grade propylene glycol as their cooling solution as mentioned above.

The other main component of design for effectiveness in the system's end use is easy installation and maintenance. This is not only convenient to end users and contractors generally, but helps to ensure continued reliability over the product's lifetime. The N-Series Chiller, for example, is a complete, factory run tested chiller package. Because it is custom-designed to meet customers' needs and requires no modifications in the field, the chiller can be installed and maintained easily. Optional pump packages complete with valves and tanks are available from the factory. All of the pump packages are factory run tested to ensure operation before shipment. Additionally, all customers have a single point of contact for technical support, parts, and preventative maintenance instructions, for maximum convenience throughout the product's lifetime.

Cooling systems designed specifically for wine processing and storage needs, such as the N-Series Chiller, are designed to meet key criteria that cannot be met by mass produced commercial-grade cooling systems. Well-designed, state-of-the-art wine cooling systems are capable of achieving the ideal temperatures for wine production, of operating reliably throughout their lifetime regardless of environmental conditions, and are designed for safe and convenient use in wineries. These cooling systems protect wineries' investments in their harvest by ensuring the consistent cooling needed for successful wine processing. **BP**

*Century Refrigeration is a division of RAE Corporation. For more information visit Century Refrigeration at [www.raecorp.com](http://www.raecorp.com)*

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**“These cooling systems protect wineries’ investments in their harvest by ensuring the consistent cooling needed for successful wine processing.”**

**— Kevin Trowhill, Vice President, Century Refrigeration**



# Cooling Towers Offer Data Centers WATER AND ENERGY SAVINGS

By Douglas Bougher and Kent Martens, P.E.,  
SPX Cooling Technologies, Inc.

► The number of data centers in the United States continues to grow in response to the enormous amount of digital information stored and streamed. The massive computer power within these data centers generates heat, making efficient cooling a key building system requirement. Evaporative cooling towers are an integral part of many data center cooling systems.

Recently some have questioned the use of cooling towers, citing water scarcity to bolster their arguments. But a thorough examination of water use for local onsite cooling towers compared to water use to generate power at regional fossil fuel power plants reveals surprising results.



*Evaporative cooling towers are an integral part of many data center cooling systems, depending on their location.*

## COOLING TOWERS OFFER DATA CENTERS WATER AND ENERGY SAVINGS



*Mechanical evaporative systems are often more efficient than dry systems, reducing water usage at power plants.*

### Data center cooling options

There are multiple ways to cool data centers, depending on the size, computer capacity that must be cooled, regional energy costs and the data load and density. Popular options include:

- Water-cooled chiller plant – includes chiller system, pumps, cooling tower and plate/frame heat exchanger in series with the chiller
- Air-cooled chiller plant – includes chiller system and pumps

- Direct evaporative cooling – without mechanical refrigeration, also referred to as “swamp cooling”
- Adiabatic cooling – air-cooled system assisted by water-cooled system during peak conditions

To attract customers, data center operators weigh the options and look for systems that reduce operating costs and environmental impact. They pay close attention to power use effectiveness (PUE), defined as the ratio of the total amount of energy used by

a data center to the energy delivered to the computing equipment. A PUE of 1 means the heat rejection power equals the power used for the computing equipment.

Data center operators are also concerned about water use effectiveness (WUE). Cooling towers evaporate water, but the impact depends on location. According to Tim Chiddix, PE, VP Mechanical Engineering at Swanson Rink, a leader in the design of data center facility infrastructure, data centers can range from a few hundred square feet to several hundred thousand square feet and no cooling technology works well for all regions, client criteria and applications. “Each and every facility must be analyzed to determine the approach that best meets the needs of the customer and takes advantage of energy and water savings opportunities of the particular region.”

Swanson Rink specifies equipment as part of its data center practice and frequently combines cooling towers with mechanical chillers for efficient cooling.

### Water use issues must be evaluated holistically

The extended drought throughout the Western states has caused many companies



**“Each and every facility must be analyzed to determine the approach that best meets the needs of the customer and takes advantage of energy and water savings opportunities of the particular region.”**

**— Tim Chiddix, PE, VP Mechanical Engineering at Swanson Rink**



**TABLE 1 - AVERAGE WATER CONSUMPTION AT POWER PLANTS**

| STATE      | GALLONS/KWH |
|------------|-------------|
| Colorado   | 1.20        |
| Arizona    | 7.88        |
| California | 4.64        |

to reexamine the impact of water usage for cooling data centers. Some have questioned whether onsite cooling towers use too much water given these shortages. In evaluating the best cooling strategy for a data center, it is critical to view water usage holistically, including water use where the power is made. When viewed in this light, mechanical evaporative cooling systems are often far more efficient than alternative dry systems.

The amount of water used by the steam cycle of a fossil-fuel based power plant to generate electricity may be greater than the amount of water used by the data center cooling tower. An example is an air-cooled system that uses 1 megawatt (MW) of power per year compared with a water cooled system that uses 0.5 MW per year and 3,000 gallons of water per minute. The number of gallons the power plant uses to make the additional 0.5 MW to power the air-cooled system is actually greater than the amount of water that would be used locally by the water cooled system's cooling tower. Cutting down the energy used from power plants may actually save water.

Swanson Rink's Tim Chiddix and Brook Zion evaluated the water use issue in a white paper, *Data Center Water Usage for Denver, Phoenix and Los Angeles: A Look at the big picture*. Chiddix and Zion examined whether reduction in water use at an individual data center facility

**TABLE 2 – FULL LOAD CHILLER POWER CONSUMPTION**

| CHILLER TYPE | DENVER (KW/TON) | PHOENIX (KW/TON) | LOS ANGELES (KW/TON) |
|--------------|-----------------|------------------|----------------------|
| Air-cooled   | 1.250           | 1.340            | 1.250                |
| Water-cooled | 0.431           | 0.462            | 0.426                |

results in an aggregate reduction in water use for the regional water supply system.

The authors note that water is a more efficient medium than air for removing heat because evaporation enhances the cooling process. "Using water-cooled condensing systems versus air-cooled condensing systems can significantly reduce your cooling energy costs; however the effectiveness of evaporative cooling is very location-dependent, since the drier climate results in greater efficiency."

They studied whether this energy reduction comes with an increase in onsite water usage

due to evaporation. They also considered whether this evaporation is wasting water and whether data center owners should consider air-cooled equipment instead. The evaluation compared sample data centers located in Denver, Phoenix and Los Angeles. It examined the regional power grid to determine how much water the power companies consume to produce a kilowatt-hour (kWh) of power. Water consumption rate data from the National Renewable Energy Laboratory (NREL) technical report TP-550-33906<sup>1</sup> is shown in Table 1.

The study looked at cooling for a sample data center with a steady 1,500 kW cooling load. The authors compared a standard efficiency water-cooled chiller system and a standard efficiency air-cooled chiller system, as well as an evaporative system with no mechanical cooling. The water-cooled plant includes a chiller system, pumps, cooling tower and plate/frame heat exchanger in series with the chiller.



Some systems can utilize "free cooling" or "water-side economizer" technology for higher efficiency.

## COOLING TOWERS OFFER DATA CENTERS WATER AND ENERGY SAVINGS

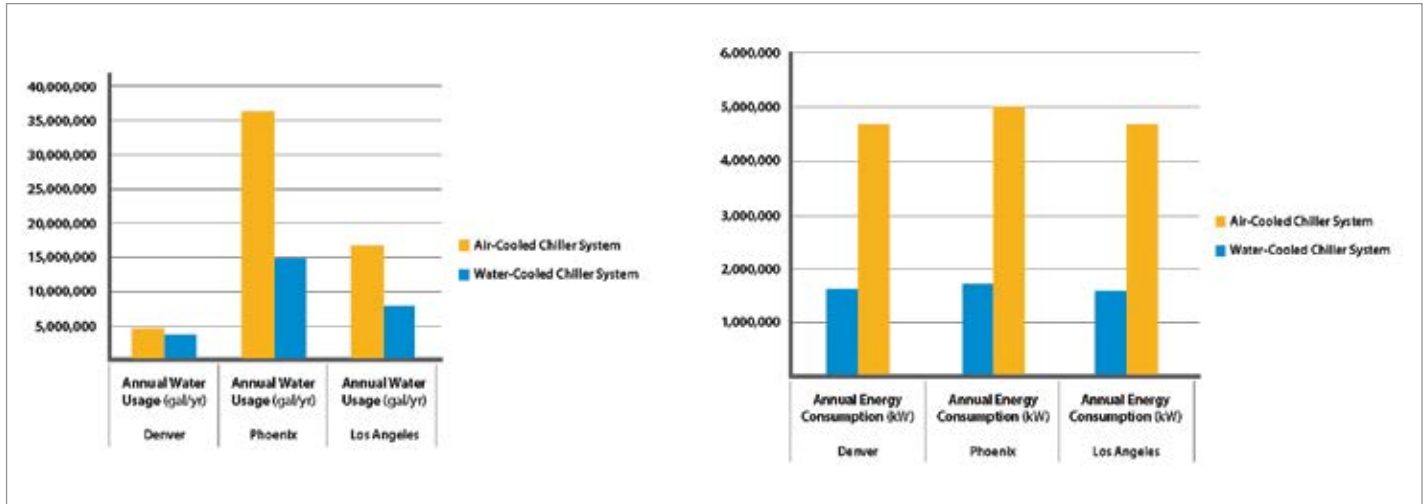


Figure 1 – Comparison of water and energy use in air-cooled and water-cooled chiller systems.

Source: Data Center Water Usage for Denver, Phoenix and Los Angeles: A Look at the big picture, by Tim Chiddix, PE, ATD and Brook Zion, PE, ATD

TABLE 3 – DATA FOR COOLING SYSTEM COMPARISON

| Sample 1,500 kW data center |                                |                                |                                |
|-----------------------------|--------------------------------|--------------------------------|--------------------------------|
|                             | Denver                         | Phoenix                        | L.A.                           |
| SYSTEM                      | ANNUAL ENERGY CONSUMPTION (KW) | ANNUAL ENERGY CONSUMPTION (KW) | ANNUAL ENERGY CONSUMPTION (KW) |
| Water Cooled Chiller        | 1,610,748                      | 1,726,603                      | 1,592,062                      |
| Air Cooled Chiller          | 4,663,470                      | 4,999,089                      | 4,663,470                      |
| SYSTEM                      | ANNUAL WATER USAGE (GAL/YR)    | ANNUAL WATER USAGE (GAL/YR)    | ANNUAL WATER USAGE (GAL/YR)    |
| Water Cooled Chiller        | 3,593,000                      | 14,844,000                     | 7,732,000                      |
| Air Cooled Chiller          | 4,645,000                      | 36,182,000                     | 16,640,000                     |
| Difference                  | 1,052,000                      | 21,338,000                     | 8,908,000                      |
| % of Water Use Reduction    | 22.60%                         | 59.00%                         | 53.50%                         |

The air-cooled chiller includes the chiller system and pumps. Table 2 shows the full load power consumption of the air-cooled chiller was significantly higher than that of the water-cooled chiller.

Water use, through evaporation, was based on dry-bulb and wet-bulb temperature data

from a Typical Meteorological Year (TMY3) obtained from the National Solar Radiation Data Base (NSRDB).<sup>2</sup> The authors found that the water-cooled chiller system in Denver consumed 1,610,748 kWh of energy and the air-cooled chiller system consumed 4,663,740 kWh annually.

Figure 1 shows the energy and water usage for the mechanical chiller systems analyzed in each city. Water use shows significant differences because the amount of water consumed at the power generation facilities is far greater than water consumed on site.

The air-cooled chiller system consumes more power and evaporates no water on site. All of its water use is at the rate of power plant water consumption. By contrast, the water-cooled chiller has lower power consumption and a combination of onsite and power plant water consumption.

According to Chiddix, municipalities requiring data centers to use less energy and water onsite may not have considered the full implications of these requirements. In his opinion, if the power generating plant is considered in the equation, the cooling technologies selected for the data center may actually result in more overall energy and water use.



### Additional energy-saving factors to consider

Water-cooled technologies are more efficient, particularly when “free cooling” is employed during periods of cooler weather. Free cooling, also referred to as “water-side economizer” cooling, is an economic method of using low external air temperatures to assist in chilling water. When operating in free cooling mode, the water from the cooling tower is cold enough that mechanical refrigeration by the chiller is not required. This reduces the energy requirement significantly, typically by 75 percent or more. To take advantage of the energy savings possible with free cooling, there must be sufficient hours of cold weather to justify the additional equipment investment for the plate/frame heat exchanger and other components.

An evaluation of the benefits of cooling towers in data center cooling must also consider “variable flow,” another method to reduce energy consumption. Cooling towers are sized for summer design condition; variable flow enables users to reduce the water flow from the cooling tower to the chiller during cooler seasons. Fans are operated at a lower speed, which reduces energy usage. Taking advantage of free cooling and variable flow modes can dramatically reduce cooling tower energy use.

Cooling tower modularity provides another advantage. Data center owners may prefer to build out their facilities over time as server

demand grows. To control initial capital expenditures and operating costs, data center operators may add cooling capacity later as needed by utilizing systems that incorporate factory-assembled modular cooling towers as the facility grows. It is important for data center construction to be completed on schedule so that servers can be operational quickly to generate revenue. Modular pre-assembled and field-erected cooling towers can meet time-sensitive delivery requirements and construction schedules.

### Weighing the water options

There are many combinations of evaporative and mechanical cooling solutions that can be evaluated to meet data center cooling requirements. As the discussion of water is added to the list of design considerations, it is important to understand and evaluate the relationship between utility power and local water consumption in order to make well-reasoned decisions for achieving energy and water conservation goals. **BP**

#### About the Authors

*Douglas Bougher is commercial director for HVAC and Refrigeration markets and Kent Martens is western regional sales manager for SPX Cooling Technologies, Inc., Overland Park, KS. For more information visit [www.spxcooling.com](http://www.spxcooling.com)*

<sup>1</sup> Torcellini, P., Long, N. and Judkoff, R. “Consumptive Water Use for U.S. Power Production.” December 2003. Accessed October 31, 2016. <http://www.nrel.gov/docs/fy04osti/33905.pdf>

<sup>2</sup> National Renewable Energy Laboratory. “National Solar Radiation Data Base. 1991-2005 Update: Typical Meteorological Year 3.” NREL.gov [http://rredc.nrel.gov/solar/old\\_data/nsrdb/1991-2005/tmy3/](http://rredc.nrel.gov/solar/old_data/nsrdb/1991-2005/tmy3/)

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# 2017 AHR EXPO Show Report

## CHILLER & COOLING TOWER TECHNOLOGY

By Rod Smith, Chiller & Cooling Best Practices Magazine



► The 2017 AHR EXPO was held January 30 to February 1 in Las Vegas. The 2017 AHR Expo set several records, including attendance of more than 68,000 registered visitors and exhibitor personnel. The Show was by far the largest and best attended Expo in the Western states, with some 1,968 exhibiting companies.

### Cooling Towers

Evapco presented their Eco-ATW line of 10-400 ton (single cell) closed circuit cooling systems featuring a broad array of water and energy-saving features. I spoke with Assistant Product Manager (for Closed Circuit Coolers) Matthew Shank who said, “The units feature



Matthew Shank next to the EVAPCO Eco-line of ATW closed circuit coolers.



Baltimore Air Coil's Jim Fino reviewed the HXV HYBRID line of cooling towers focused on maximizing energy and water conservation.



spiral fin heat exchangers with enhanced surface areas both inside and on the exterior of the tube. This makes for a more compact unit using less horsepower and able to run “dry” more hours of the day.” Running dry provides reduced energy consumption as the spray pump is turned off. The units feature Sage Control Systems which are Allen Bradley based PLC controls responding to a suite of temperature sensors installed throughout the unit. Shank continued, “Rather than running off a pre-programmed algorithm, the Eco-ATW line runs based upon real-time load and ambient conditions.” Shank continued on to say the Eco-ATW Series was successfully introduced six years ago and continues to gain momentum. Today it represents a significant portion of Evapco’s closed circuit cooling system sales.

The SPX Cooling Systems booth presented many innovations for the Marley brand of cooling towers. Sales Vice President Doug Bougher’s team walked us through the all-copper, direct-drive (reduced maintenance vs. belt drive) LW closed-circuit fluid cooler for HVAC systems, the Vector adiabatic cooling system, the NC Everest cooling towers, and the Marley AIO control system. The 5000 to 40,000 gallon per minute line of Marley NC Everest cooling towers get their name for being, technical term here-for being big. They have reduced the number of cells (a 6 cell field erected tower is only a 3-4 cell NC Everest) making them much taller and larger. This provides greatly reduced installation costs-estimated to be thirty percent (30%) lower than field erected units. The units feature enormous 19 foot diameter fans and reduced package kilowatt consumption. The systems require only a 10-day install time providing reduced connection, piping, and installation costs.

Baltimore Aircoil Company (BAC) has been manufacturing cooling towers for over 75 years. Their closed circuit cooling towers are used in most industrial applications including air compressors, water source heat pumps and cooling for weld machines, mold water, furnace, transformer and power plant auxiliary cooling. As I learn enough to “be dangerous” I see BAC has closed circuit cooling towers focusing on the different priorities a factory may have. The cooling tower catching my attention was the HXV Hybrid Tower system designed to maximize water conservation by using evaporative adiabatic and dry operation modes to optimize water and energy conservation. The hybrid design permits efficiency during peak heat-load seasons and efficiency during the lowest load periods.

Delta Cooling Towers Delta, which pioneered the HDPE (high-density polyethylene) plastic cooling tower in the 1970s, displayed their newly launched line of towers constructed of anti-microbial resin, which is fully compounded into the base cooling tower material. The anti-microbial resin contains additives that operate on a cellular level to continuously disrupt and prevent uncontrolled growth of microorganisms and biofilm within the cooling tower. Efficacy tests were performed by Special Pathogens Laboratory, The Legionella Experts®.

REYMSA manufactures a broad range of all-fiberglass cooling towers. Western Regional Sales Manager, Pete Waldmann, said the firm continues to grow in North America and that they have long offered clients many opportunities for significant water-saving solutions.



*The new Delta Anti-Microbial All-Fiberglass Cooling Tower*



*REYMSA's Pete Waldmann describing the benefits of all-fiberglass cooling towers.*

## 2017 AHR EXPO SHOW REPORT: CHILLER & COOLING TOWER TECHNOLOGY



Smartt CEO and Founder, Roger Richmond-Smith, next to the V-Class Modular Triple Series Chiller.



The Trane EcoWise S Series Centrifugal Chiller.



Rich Whitmore and Pete Peresie (left to right) next to the Motivair ChilledDoor® Rack Cooling System.

### Central Chiller Plants

MTA continues to grow its free-cooling and standard chiller business in North America. I know the free-cooling concept has caught the attention of many of our readers. At AHR, they displayed the TAEvoTECH air-cooled industrial chiller line using scroll refrigeration compressors and R410A refrigerant. This line features an innovative, high-efficiency finned-coil evaporator installed inside the water storage tank allowing for higher flow rates, lower pressure drops and lower susceptibility to fouling than brazed plate type evaporators.

Motivair displayed their MLC-SC-FC chillers with integrated “Free-Cooling”. The high-efficiency scroll compressor plant is designed to cool the designated heat load during summer months. When ambient temperatures fall overnight or during cooler seasons, the “free-cooling” system activates automatically as directed by the PLC control package. I was also impressed by the innovative spirit at Motivair when CEO Rich Whitmore showed me their ChilledDoor® Rack Cooling System for mission critical cooling systems. Due to their work supplying global super computer leader Cray Inc., Motivair was the 2016 recipient of Cray Inc’s 2016 Outstanding Supplier award!

Dimplex Thermal Solutions displayed their P-Series modular pressurized chiller system and the “AHR New Product” recognized SI 35TUR reversible high-efficiency brine-to-water heat pumps. The P-Series’ control system permits a single module to operate as a stand-alone chiller with the ability to add modules and a master controller as cooling capacity needs grow. Capacities are from 60,000 btu/hr to 720,000 btu/hr per module.

Trane’s booth was huge but it was still quite a challenge to find space inside! Parent Company Ingersoll Rand has made a commitment to sustainability including investing \$500 million in product-related research into new energy efficient product technology, reducing the greenhouse gas (GHG) footprint of their products by 50% by 2020, and reduce company operations-related GHG emissions by 35 percent. I like it when companies “walk the talk”. An example of this commitment is the EcoWise™ portfolio of products to address the growing demand for climate-friendly products. Product Portfolio Manager Vijay Deshmukh showed me their new line of S Series centrifugal chillers which can operate with



either R-123 or low-global warming potential refrigerants R-514A or R-123zd – both featuring an ultra-low GWP of less than 2.

### Custom Conditioned Air Systems and Piping for Secondary Cooling

Hydrothrift had a booth where General Manager Paul Heston and his team were discussing, amongst other things, their custom conditioned air systems for the most demanding environments. Television production trailers, mobile medical units, telecommunication portable units, mobile command and control centers are some application examples requiring critical HVAC solutions. Hydrothrift presented their customized solutions designed to operate in extreme ambient conditions from -20°F to 115°F.

The Superior Signal Company presented refrigerant leak detection devices and the AccuTrak ultrasonic leak detectors for compressed air systems. Owner Jim Kovacs described the AccuTrak® Model VPX-WR as an extremely accurate and durable product, offering high performance at an excellent value.

After years of writing about optimizing compressed air piping systems, I was interested by what I saw at the GF (Georg Fischer) Piping Systems booth. They presented their pre-insulated piping called the COOL-FIT® ABS Plus System designed for secondary cooling and refrigeration systems. The corrosion-resistant ABS plastic piping is pre-insulated with high-quality PUR foam in addition to a UV-resistant outer jacket. Rapidly replacing steel pipe, they said the COOL-FIT® system is ideal for use in cold storage and food and beverage production.

Victaulic is an amazing Company experiencing a multi-year run of amazing growth. Where don't you see their products on cooling, compressed air, blower and vacuum system piping?! Visiting their booth I was impressed by their REVIT® 3D pipe routing modeling software and software training programs to teach contractors and engineers best practices on designing piping systems.

AHR EXPO is an amazing show for all involved in the cooling system industry. I look forward to their next installment, in Chicago, January 22-24, 2018. **BP**

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Angelo Mastrangelo, Howard Kielar, Dan Rogowski, Tim West, Craig Thorensen, and Brian Corretore (left to right) at the MTA booth.



Paul Heston, Bruce Williams and Ron Lair (left to right) at the Hydrothrift booth.



Tim True next to the new SI 35TUR reversible high-efficiency brine-to-water heat pumps at the Dimplex Thermal Solutions booth.

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# INDUSTRIAL COOLING SYSTEM INDUSTRY NEWS

## First Evapcold Units Successfully Installed in Utah

Since its founding in 1901, The Western Gateway Storage Company in Ogden, Utah, has provided innovative cold storage solutions to Utah and the surrounding states while growing and expanding as a company, priding themselves on their modern facilities and commitment to customer satisfaction. Western Gateway's commitment to keep their customers' inventories, safe, clean, and cold, while investing in the most state of the art and efficient technology led them to EVAPCO, Inc. and the Evapcold Refrigeration System. In April 2016, Western Gateway became the first end user to install the Evapcold Low Charge Ammonia Packaged Refrigeration System, installing two Evapcold Systems in their new cold storage facility in Ogden, Utah.



When Western Gateway found themselves in the market for a refrigeration system for their new cold storage facility, they looked for an innovative and efficient system, one that was relatively simple to maintain, and had a short installation time. Western Gateway President, David Bornemeier and Jack Gage, owner of Jack Gage Refrigeration, believe that the Evapcold Refrigeration System from EVAPCO provides significant advantages over a traditional centralized ammonia refrigeration system as well as fulfills all of Bornemeier's requirements. But it took them awhile to reach this decision. Bornemeier and Gage went through different designs before choosing Evapcold. "We have a far superior refrigeration design now in comparison to the systems we had considered before," Bornemeier said, "I feel like we have the Ferrari of the heat transfer industry."

For Bornemeier and Gage, one of the most significant advantages Evapcold has over a traditional central system is the reduced installation time for Evapcold compared to a customized system. According to Gage, a custom-built central system typically takes 4,000 hours to install, while he only anticipated 300 hours of installation for the



roof-mounted Evapcold system. For Western Gateway, this reduced installation time meant that they were able to build their new cold storage facility while their Evapcold packaged refrigeration systems were being built, whereas a customized system would have to wait for the facility to be built before its installation could begin.

Western Gateway also chose the Evapcold system because the low-charge ammonia system is safer and will reduce Western Gateway's regulatory burden and compliance cost. While a centralized, stick-built system would have piped thousands of pounds of ammonia throughout the entire Western Gateway facility, the Evapcold system contains the ammonia in just two sites, the Evapcold systems located on the building's roof, and uses only 4 pounds of ammonia per ton of refrigeration.



**"According to Gage, a custom-built central system typically takes 4,000 hours to install, while he only anticipated 300 hours of installation for the roof-mounted Evapcold system."**

## INDUSTRIAL COOLING SYSTEM INDUSTRY NEWS

Gage also explained that the Evapcold system is expected to require significantly less maintenance than a traditional system, "The [Evapcold] equipment is smaller, and there are fewer parts, so we expect maintenance costs to be lower." Additionally, the Evapcold system can be installed on the roof, which saves valuable floor space for Western Gateway. On top of all of this, Western Gateway appreciated Evapcold's ease of operation and has one manual for operation and maintenance procedures. EVAPCO has a single-source responsibility for the complete Evapcold system design, factory assembly, operation, and safety.

In mid-December, Bornemeier, his wife, Western Gateway's CEO Becky Bornemeier, and their three children, traveled to Taneytown, MD to visit EVAPCO, Inc. World Headquarters and factory and ceremoniously turn the final bolt on their Evapcold packaged unit. The Evapcold unit, one of two low charge units destined for Western Gateway Storage, was shipped to Taneytown, MD from the EVAPCOLD factory in Greenup, Illinois, where both Evapcold units were originally manufactured. Once in Taneytown, the Evapcold unit was put through rigorous testing in EVAPCO's state-of-the-art Research and Development Laboratory. The Bornemeiers, along with contractor Jack Gage, were able to walk inside the Evapcold unit and receive a quick tour before the unit was turned on for the first time. EVAPCO Vice President Kurt Liebendorfer then showed the group the cold air chamber, to which David Bornemeier said, "I love feeling the cold air!"

For Western Gateway, the Evapcold low charge system was the only choice to accomplish their goals and fulfill their commitment to efficiency, safety, and innovation, but Western Gateway was also attracted to EVAPCO because of its customer service and commitment to shared values. When Western Gateway's CEO Becky Bornemeier learned that many EVAPCO

employees are the second-generation of their family to work at EVAPCO she said, "I like that EVAPCO is family-oriented, and they take care of their employees, and they extend their arms out further and take care of their customers. That's how we run our business."

Before their visit ended, EVAPCO President and CEO Bill Bartley stopped by to say hello to the group. He handed the Bornemeiers his card and told them to call him any time, day or night, if they needed anything.



On April 21<sup>st</sup>, both Evapcold units and two EVAPCO fluid coolers arrived at Western Gateway Storage and were mounted onto structural roof steel in less than 6 hours.

In late May, when the new cold storage building was ready, Jack R. Gage Refrigeration completed the installation of the Evapcold units in just a few weeks.

Successful startup of both Evapcold units occurred on June 17<sup>th</sup>. Both units performed well under 100°F "hot-start" summer ambient conditions. The Evapcold units successfully pulled the warehouse temperature to a -10°F design temperature incrementally over a 10 day period with zero problems. In fact, after such a successful startup, Bornemeier subsequently wanted to see if the Evapcold units could pull his new building down to -20°F, in the event he has customers that require an even colder temperature. The Evapcold units easily pulled the building temperature down to -20°F and passed his test. The new building and Evapcold units

are now successfully running at -10°F design room temperature.

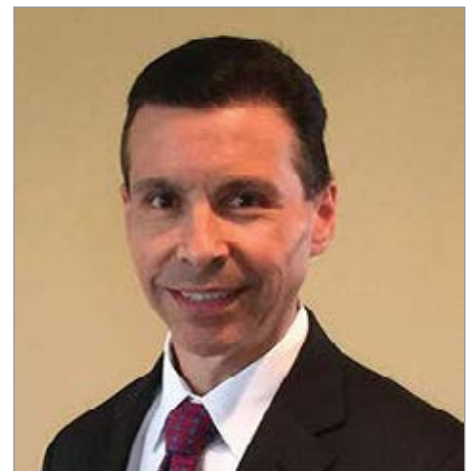
According to David Bornemeier "Western Gateway's mission is to keep our customer's inventory Safe, Clean, and Cold. Having now run the Evapcold units in our freezer, we are reminded of all the reasons why we chose EVAPCO. With a lower ammonia charge contained totally outside the freezer space (on the roof), we are a Safer AND Cleaner operation than we otherwise would have been with an antiquated stick-built system. We were also pleased to find our facility easily maintained a colder temperature than we originally specified.

It's one thing for a company to say they can deliver, but it takes all the right people to make it happen. On all accounts our experience with EVAPCO, from initial design and estimating to install and commissioning, has been a pleasure and we look forward to our next project."

***For more information,  
visit [www.evapco.com](http://www.evapco.com)***

### **Dimplex Thermal Solutions Appoints Bill Bohr as President**

Dimplex Thermal Solutions (DTS) is pleased to announce the appointment of Bill Bohr as the company's new President. The announcement



*Dimplex Thermal Solutions' new President, Bill Bohr.*



was made by Fergal Naughton, CEO of Glen Dimplex, DTS' parent company and will be effective Sept. 26, 2016.

Naughton said, "Bill has spent more than 20 years progressing through the Grand Rapids, MI division of the Pump Solutions Group of the Dover Corporation. For the past four years he served as General Manager of Hydromotion Inc., a division of Texas Hydraulics. We are excited to put his experience and expertise to work as the head of Dimplex Thermal Solutions."

Bohr earned a bachelor of science in engineering at Grand Valley State University and an MBA at the University of Chicago.

"I am eager to join the DTS team," Bohr said. "This company, its parent company, and premier brands have a great reputation for engineering high-quality systems backed by responsive customer service. I look forward to furthering the company's success and pursuing additional growth."

Bohr will be based out of the company's Kalamazoo location.

**For more information, visit [www.dimplexthermal.com](http://www.dimplexthermal.com) or call 800-968-5665.**

### Danfoss names head of oil-free technology development

Danfoss has named Mads-Peter Clausen as Vice President of oil-free technology development.

In this new role, Clausen will be responsible for the coordination and development of the company's oil-free technology portfolio, which currently includes award-winning Danfoss Turbocor® magnetic bearing centrifugal compressors for high-efficiency water-cooled and air-cooled chillers.

"As HVACR energy-efficiency and refrigerant regulations and standards grow, we expect



*Mads-Peter Clausen, Vice President, Oil-Free Technology Development for Danfoss.*

the demand for ultra-efficient solutions to accelerate," said Ricardo Schneider, President of Danfoss Turbocor Compressors. "Mads-Peter will help us to expand Danfoss' oil-free portfolio beyond the current products and applications."

Mads-Peter Clausen has spent 14 years with Danfoss in various roles around the world, including vice president of appliance controls and senior associate of mergers and acquisitions. In 2014, he was elected to serve as a member of the Danfoss Board of Directors, which is a position he continues to hold. Clausen has and a bachelor's degree in mechanical and production engineering from the University of Southern Denmark and a master's from the University of Georgia

Clausen is based in Tallahassee, Florida, which is home to Danfoss Turbocor Compressors' manufacturing facility and the new Danfoss Application Development Center set to open later this year.

### About Danfoss

Danfoss engineers technologies that enable the world of tomorrow to do more with less. We meet the growing need for infrastructure, food supply, energy efficiency and climate-friendly solutions. Our products and services are used

in areas such as refrigeration, air conditioning, heating, motor control and mobile machinery. We are also active in the field of renewable energy as well as district heating infrastructure for cities and urban communities. Our innovative engineering dates back to 1933 and today Danfoss is a world-leader, employing 23,400 employees and serving customers in more than 100 countries. We are still privately held by the founding family.

**For more information, visit [www.danfoss.com](http://www.danfoss.com).**

### Colgate-Palmolive Recognized as a ENERGY STAR® Partner of the Year-Sustained Excellence

Colgate-Palmolive Company (Colgate) is a global consumer products company operating in over 200 countries and territories. Colgate understands the importance of energy management and the potential consequences of climate change and is committed to acting responsibly to protect its people and the environment.



Colgate is receiving the ENERGY STAR® Partner of the Year—Sustained Excellence recognition for the company's ongoing sustainability efforts in mitigating climate change through energy efficiency. Key 2015 accomplishments include:

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- Improving energy efficiency by 2.8 percent compared to 2014 and more than 20 percent since 2005. Since 2009, Colgate has avoided over \$295 million in energy costs while reducing carbon dioxide emissions by more than nine percent.
- Implementing a climate change strategy that influences the company's carbon footprint through ambitious emissions goals, management of energy, and providing for low carbon products, energy, and supply chain. The company increased renewable energy purchases by 30 percent in the United States.
- Engaging employees through Energy Treasure Hunts to identify over 200 energy reduction ideas for an estimated 36,664 megawatt hours in energy savings.
- Achieving the ENERGY STAR Challenge for Industry at 13 facilities, 10 of which are repeat winners.
- Expanding the "Save Water" campaign in new markets to raise awareness of water conservation.
- Sharing best practices with other ENERGY STAR partner companies.

**For more information, visit [www.colgate.com](http://www.colgate.com) or [www.energystar.gov](http://www.energystar.gov)**

**To view the Colgate Sustainability Report visit: <http://www.colgate.com/app/Colgate/US/Corp/LivingOurValues/Sustainability/HomePage.cvsp>**

### Aggreko Acquires DRYCO, LLC.

Power generation and HVAC specialty rental company, Aggreko plc, has acquired DRYCO, LLC of Chicago, Illinois for an undisclosed amount. DRYCO was founded in 2000, and specializes in moisture control, drying, heating, and cooling applications within the shipping,



*DRYCO specializes in moisture control, drying, heating, and cooling applications.*

manufacturing, food processing, construction, and industrial painting industries.

It has 10 full-service locations in North America, and has built a strong customer base in its targeted industries, which complement Aggreko's growth strategy. The acquisition will add more than 60 experienced employees and approximately 6,000 specialized assets to Aggreko's fleet.

"This acquisition of DRYCO combines the deep technical strength of two highly respected market leaders and provides our customers with an unparalleled range of services that address their HVAC and moisture control needs," said Mel Parker, Managing Director, Aggreko North America. "We are pleased to have DRYCO join the Aggreko team, enabling us to accelerate growth and meet the rapid demand for our services in the shipping, food and beverage, and painting and coatings industries."

Joe Schroeder, CEO of DRYCO, said, "DRYCO is excited to join forces with Aggreko to become the leading provider of drying and dehumidification services. Our teams share the same passion and commitment to service excellence, and we look forward to working together to further grow Aggreko's business."

Aggreko plans to fully integrate the operations of DRYCO into its North America business and is developing expansion plans to enter additional sectors and global markets.

**For more information, visit [www.aggreko.com](http://www.aggreko.com).**

### ASHRAE/IES Publish 2016 Energy Efficiency Standard

Numerous energy savings measures resulting from industry input are contained in the newly published energy efficiency standard from ASHRAE and IES.

ANSI/ASHRAE/IES Standard 90.1-2016, *Energy Efficiency Standard for Buildings Except Low-Rise Residential Buildings*, contains 125 addenda published since the 2013 standard. The 2013 standard currently serves as the commercial building reference standard for state building energy codes.

This 2016 version is the 10th edition published since the original standard was first published in 1975 during the energy crisis of the United States. "It is the overall goal of each version to create a consensus standard that saves energy and is technically feasible and cost effective," said, Drake Erbe, chair of the Standard 90.1 committee. "In addition,



as a result of a strategic initiative begun in the 2013 cycle, the 2016 version has a new format that we believe will be easier for users, a new way of incorporation of reference material from other standards starting with climate data, and a performance path for compliance that rewards designs for achieving energy cost levels above the standard minimum.”

Formatting

The standard has made significant formatting changes to improve its use. These include a one-column format for easier reading; exceptions separated and indented, set apart with a smaller font size; all defined terms are italicized; and alternating coloring scheme for table rows.

The most significant technical changes are as followed:

Building Envelope:

- The mandatory provisions include the addition of envelope verification in support of reduced air infiltration and increased requirements for air leakage to overhead coiling doors.
- The prescriptive requirements include increased stringency requirements for metal building roofs and walls, fenestration, and opaque doors. Requirements for Climate Zone 0 have been added.
- Improved clarity of the standard ranged from defining exterior walls to building orientation to clarity around the effective R-value of air spaces

Lighting:

- Modified control requirements that make the application of advanced lighting controls easier for increased energy savings
- Modification of exterior and interior lighting power densities that reflect the efficiency gains from LED technology in specific applications where they are proven to be effective
- Added minimum requirements for lighting in dwelling units to set limits on light source efficacy
- Added additional control for lighting in parking areas based on occupancy to reduce energy use

Mechanical:

- Chilled water plant metering – For the first time, the standard is requiring large electric driven chilled water plants to be monitored for electric energy use and efficiency.
- DOAS requirements – Dedicated outdoor air systems were introduced over 25 years ago but there were no rating or efficiency requirements with which to comply. For the first

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- time, this product class does have both efficiency and rating requirements with which they have to comply.
- Elevator efficiency –Introduces requirements for designs to include both usage category and efficiency class. While a minimum threshold is not listed, it is the first step toward including minimum elevator efficiency requirement in a future standard. The standard referenced is an ISO standard since this the current industry standard for efficiency.
  - Economizer diagnostics – The standard is implementing requirements that air cooled DX cooling unit with economizers have a monitoring system to determine that the air economizer is properly working.

**Energy Cost Budget (ECB) and Modeling.** A significant change to the application of Appendix G as follows:

- Appendix G now can be used as a path for compliance with the standard. Previously Appendix G was used only to rate “beyond code” performance of buildings. This new version of Appendix G

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can show compliance with the 2016 version of the standard in the following manner:

- The proposed building design requires a new metric the Performance Cost Index (PCI) and demonstration that it is less than that shown in Table 4.2.1.1 based on building type and climate zone.
  - Another change is that the baseline design is now fixed at a certain level of performance, the stringency or baseline of which is expected not to change with subsequent versions of the standard. Therefore, this can rate a building of any era using the same method.
- Other modifications to Appendix G include: elevator, motor, and refrigeration baselines; changes to the baseline for existing building projects; as well as specific opaque assemblies for the baseline envelope model. Modeling rule changes were also made to heat pump auxiliary heat, economizer shutoff, lighting controls, humidification systems, cooling towers, and the simulation of preheat coils.

Additional **structural changes** include:

- Reference Standard Reproduction Annex 1 at the end of the document. This annex is designed to contain extracts from

other references that are published with Standard 90.1 for the convenience of users. At present, the only standard this pertains to is ANSI/ASHRAE Standard 169, *Climatic Data for Building Design Standards*. Section 5.1.4 now cites this standard as the source for climatic data therefore extractions of tables and figures from Standard 169-2013 are included in Annex 1

- Addition of 2 weather zones 0 A/B in all prescriptive requirements tables to correspond with Standard 169.

The cost is \$119, ASHRAE members (\$140, non-members). To order, visit [www.ashrae.org/bookstore](http://www.ashrae.org/bookstore) or contact ASHRAE Customer Contact Center at 1-800-527-4723 (United States and Canada) or 404-636-8400 (worldwide) or fax 678-539-2129.

### About ASHRAE

ASHRAE, founded in 1894, is a global society advancing human well-being through sustainable technology for the built environment. The Society and its more than 56,000 members worldwide focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability. Through research, standards writing, publishing, certification and continuing education, ASHRAE shapes tomorrow's built environment today.

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**Advertising & Editorial** **Rod Smith**  
[rod@airbestpractices.com](mailto:rod@airbestpractices.com)  
Tel: 412-980-9901

**Subscriptions & Administration** **Patricia Smith**  
[patricia@airbestpractices.com](mailto:patricia@airbestpractices.com)  
Tel: 412-980-9902

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— Rich Whitmore, President/CEO, Motiva Corporation  
(feature article in August 2016 Issue)

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— Roger Richmond-Smith, CEO, Smardt Chiller Group  
(feature article in August 2016 Issue)

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