ASHRAE Philadelphia Chapter



QUAKER CITY CLIMATE

April 2024
Volume 59, Issue 9

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MEETING COSTS

Fees are based on online reservations and prepayment.

$77 Chapter Member

$77 YEA Member

$77 Student Member

$0 Life Member

$77 Society Member

$87 Non-Member

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****Limited Seats Available****

Wednesday, April 10, 2024
6:00 PM - 8:00 PM

Dinner Meeting

"Ventilation for Health and ASHRAE Standard 241-2023"

Presented By:

Darryl DeAngelis

EBTRON

Click here to register.

LOCATION

Fogo de Chão Brazilian Steakhouse
1337 Chestnut St.
Philadelphia, PA 19107

Dinner includes the full churrasco experience (or substitute for Sea Bass, Salmon, or Cauliflower Steak), Dessert, and your choice of two adult beverages.

For directions and parking, click here

See page 3 for more information.

Mark Your Calendar!

2024 Golf Outing
April 29, 2024

See page 4 for more information.

2023-2024

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President's Message

Greetings Chapter Members,

Ahh, it's nice to see some spring time weather!

In our previous chapter meeting (March 2024), we hosted an educational seminar over lunch at FoGo de Chao at the KoP location. We fully sold out the venue. Thank you to all who attended!

We are excited turn our attention to our April meeting at Fogo de Chao in **Philadelphia** where Darryl DeAngelis will be speaking on the topic of Ventilation for Health and ASHRAE Standard 241-2023. If you were unable to make the lunch in the suburbs, we would love to see you at the dinner meeting in the city! Please sign up today through the link in this newsletter or the email invitation.

On April 29th, ASHRAE will be hosting our annual charity golf outing to raise funds for the Debra H. Kennoy Scholarship. We sold out very quickly last year, so please sign up as soon as possible (see page 4). Please also consider sponsoring the event with one of the various levels of sponsorship opportunities available to choose from. The proceeds will help the Philadelphia Chapter grow our ability to fund this scholarship.

The Board and I look forward to engaging with all of you in our upcoming events. Thank you for being an active and engaging member of the Philadelphia Chapter of ASHRAE!

And don't forget your solar eclipse glasses if you plan to head outside to view this wonderful celestial spectacle.

Sincerely,
Daniel Brown
Philadelphia Chapter President
c021@ashrae.net

March Meeting Photo



April Dinner Meeting

Wednesday, April 10, 2024
6:00 PM - 8:00 PM

"Ventilation for Health and ASHRAE Standard 241-2023"

Click here to register.

Synopsis:

Did you ever wonder how modern ventilation rates came to be? Were you surprised at the enhancements in filtration and ventilation required during the COVID-19 pandemic? This presentation will review HVAC history and contrast it with current practice. Take a dive into CO2 use for control of ventilation and as an indicator of IAQ. Address updates in ASHRAE Standard 62.1 and examine new requirements of ASHRAE Standard 241. It will make the case for the benefits of ventilation and validating operation.

Learning Objectives:

- Discover the history of ventilation in buildings.
- Understand the origin and evolution of ASHRAE ventilation rates.
- Identify operational conditions that impact ventilation and IAQ.
- Contrast minimum ventilation and IAQ requirements to infectious aerosol.
- Evaluate ventilation benefits compared to energy saving strategies.

Presenter:

Darryl DeAngelis is Director of Business Development for EBTRON since 2018, a well-known pioneer in thermal dispersion airflow measurement and control technology. He is on the leadership team spearheading the company's business development and execution strategy.

Darryl graduated from the Massachusetts Maritime Academy with a B.S. in Marine Engineering and has spent over 40 years in the HVAC industry as a contractor, system designer, consulting engineer, product development engineer, sales manager, product manager, and market intelligence manager. He has four HVAC related patents and obtained LEED AP in 2003.

As a member of ASHRAE for over 20 years, Darryl has actively participated in many technical and standard committees in the development of standards and guidelines, such as 62.1, 90.1, 11, 207, and 180, focused on indoor air quality (IAQ), energy and sustainability, controls, fault detection and diagnostics (FDD), and maintenance. He is currently chair of TC 7.7 Testing and Balancing and a voting member of 62.1 Ventilation subcommittee.

Darryl is a participating voting member in ASTM, and a member of BCxA, ISIAQ, and I2SL. He represents EBTRON as a member of the board of directors for ASHB, a partner of IFMA, AABC, NASECO.

We hope you can join us!

Register today!



WHEN:
April 29, 2024
10:30 AM to 7:00 PM

WHERE:
Trump National Golf Club Philadelphia
500 W Branch Ave
Pine Hill, NJ 08021
http://www.trumpnationalphiladelphia.com/

SCHEDULE:
10:30 am - Registration begins
11:00 am - Made-to-order lunch prepared on charcoal grill
12:30 pm - Shotgun start
5:30 pm - Buffet-style banquet dinner, 1-hr open bar, and prizes

REGISTRATION:

$100 -
No golf - lunch, dinner, and open bar

$500 -
1 golfer - lunch, golf, dinner, and open bar

$1,200 -
4 golfers - lunch, golf, dinner, and open bar

Click here to register.

All contributions towards this fundraiser help support the Philadelphia Chapter of ASHRAE and the Debra H. Kennoy Scholarship Fund.

For more information, please contact
Anthony Rodio
arodio@unitasengineering.com
609-703-9095

This event sold out quickly last year.
Don't miss your chance -
register today!



The Philadelphia Chapter
of the
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Refrigerating and Air
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Hope Silverman
P 610-971-2169
hope@mmco1.com

Material can include letters to the editor, member news, upcoming events, comments on chapter programs or issues, etc.

New Philadelphia Chapter Members

David Yonks
Andrew Denno
Bruce Engelbrecht
Dr Steve Clark
Kenneth Sulkowski
Fung Lau
Brian Simons

2024 ASHRAE Annual Conference

June 22-26, 2024
Indianapolis, IN
Click here for more information.

What are the benefits of paying Philadelphia Chapter dues* ?

Discounts:

$200 Discount for Basic Class
$150 Discount for 90.1 Seminar
Free access to the Digital Directory
And much more!

* Note that Philadelphia Chapter Membership Dues are $35/year.

To receive discounts, please remit you Chapter dues when renewing online or applying for a new membership. Feel free to upgrade online by clicking here or contact c021@ashrae.net for assistance.

Membership Advancement

If you are currently an ASHRAE Associate Member, becoming a full Member is easier than you think! The following count toward the required **12 points** to advance to full membership status. You must update your ASHRAE online biography and send an email to membership@ashrae.org to advance.

Non-accredited degree = 4 points
PE = 4 points
Accredited degree = 6 points
Industry experience = 1 point/year

Crossflow vs. Counterflow Cooling Towers

Crossflow and counterflow are two ways to describe how air moving through a cooling tower interacts with the process water being cooled and their fundamental differences. The focus is on factory-assembled induced-draft crossflow and counterflow cooling towers. For more information on other types of crossflow and counterflow towers, refer to the white paper "Classifying Cooling Towers" *AE-SK-19*.

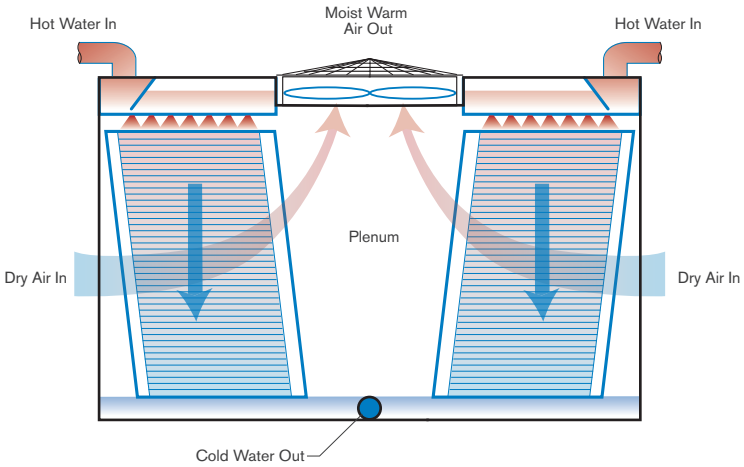


Figure 1 Crossflow cooling tower schematic

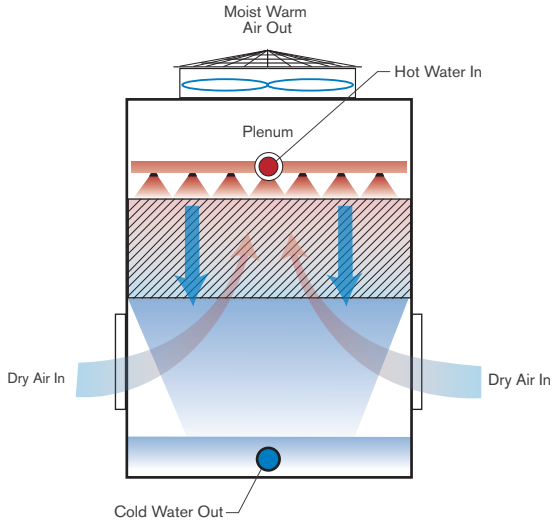


Figure 2 Counterflow cooling tower schematic

The fundamental difference between crossflow and counterflow cooling towers is how the air moving through the cooling tower interacts with the process water being cooled. In a crossflow tower, air travels horizontally across the direction of the falling water whereas in a counterflow tower air travels in the opposite direction (counter) to the direction of the falling water. See **Figure 1** and **Figure 2** for a visual explanation.

Space Requirements

The method by which air interacts with the process water creates two different styles of plenum areas as illustrated in **Figure 1** and **Figure 2**, which has a direct effect on the footprint of the cooling tower. Up to about 750 tons (3295 kW), a counterflow cooling tower requires less plan area than a crossflow cooling tower, which makes counterflow cooling towers advantageous in densely populated metro areas with limited space. At about the 750 ton mark, counterflow towers offer little to no advantage in footprint relative to a crossflow tower. Furthermore, it is critical to realize not all available real estate can be treated the same. Depending on the application, a crossflow cooling tower may require less total area than a counterflow tower even at heat loads less than 750 tons. This is because of the air inlets on each style of tower. A crossflow tower only has two air inlets compared to four on a counterflow cooling tower, see **Figure 3** and **Figure 4**.

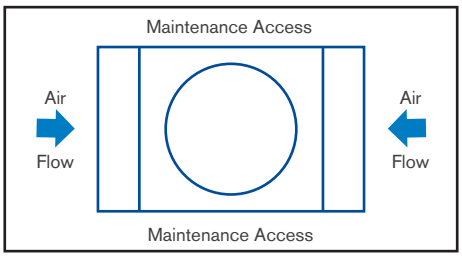


Figure 3 Crossflow effective footprint

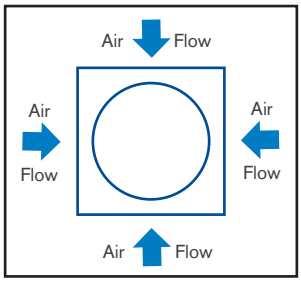


Figure 4 Counterflow effective footprint

Maintenance

Another direct consequence of the different plenum areas is maintenance access. As shown in **Figure 5** the large plenum area in the center of a crossflow tower is large enough to stand, making it very easy to access equipment for inspection and maintenance. A counterflow tower by nature has very limited space to access its components which makes maintenance and repair more complicated and time consuming. A cut-away of a counterflow tower in **Figure 6** shows the limited space available for maintenance.



Figure 5 Crossflow cutaway showing large plenum area for easy maintenance



Figure 6 Counterflow cutaway showing minimal working space for maintenance

Water Distribution

Another significant design difference between a crossflow and counterflow tower is the method by which water is distributed throughout the tower. In a crossflow tower, the process water is pumped to the top of the tower and discharges into a hot water basin with nozzles as shown in **Figure 7**. The nozzles are gravity fed with the height of the water above the nozzles being the driving force. When sizing a condenser water pump for a crossflow tower only the height from the pump to the top of the tower and the friction loss in the piping, including any flow control valves, need to be considered.

In a counterflow tower, the process water is pumped into a header box about three-fourths of the way up the tower. The header box then distributes the water into branch arms and nozzles. A pressurized water distribution system is created by the branch arms and nozzles fed by the header box as shown in **Figure 8**. When sizing a condenser water pump for a counterflow tower, the height from the pump to the header box, the friction loss in the supply piping, and the pressure drop through the branch arms and nozzles all need to be considered. The tower manufacturer will supply the total dynamic head through the tower at design flow, which makes pump sizing easier for the system designer.

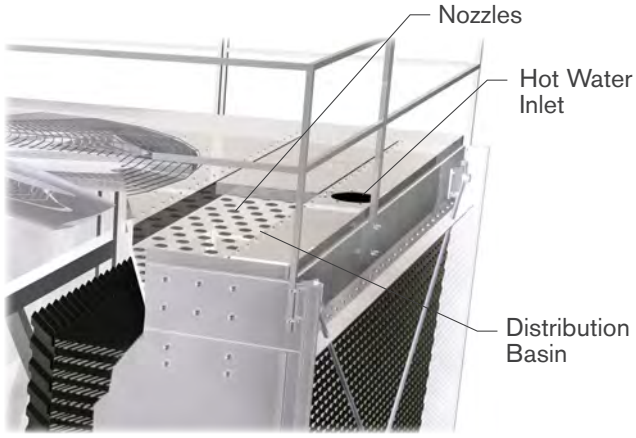


Figure 7 Crossflow distribution basin with gravity-fed nozzles

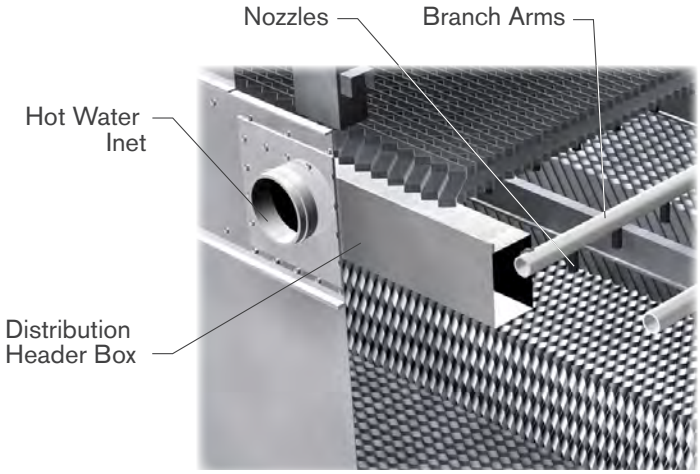


Figure 8 Counterflow distribution through header box to branch arms and nozzles

Variable Flow and Cold Weather Operation

Water distribution design has a direct effect on variable flow and cold weather operation. With the use of nozzle cups, a crossflow tower can utilize as little as 30% of design flow and maintain even water distribution across the fill as shown in **Figure 10**. An even pressure drop across the fill allows manufacturers to accurately predict the performance of the tower. Furthermore in cold weather operation, the use of nozzle cups on the inboard side keeps the heat load towards the side of the fill exposed to the elements.

At low-flow operation, counterflow cooling towers have less energy and nozzles to distribute water across the entire cross section of the fill, which limits low flow capability to about 70% of design flow. At flows under 70% of design water channeling begins to develop as shown in **Figure 12**. This channeling leads to unpredictable performance, scale build up, and icing during cold weather operations. Furthermore, the turbulent splashing water into the cold water basin can lead to non-visible ice accumulation on the inside louver faces during cold weather.

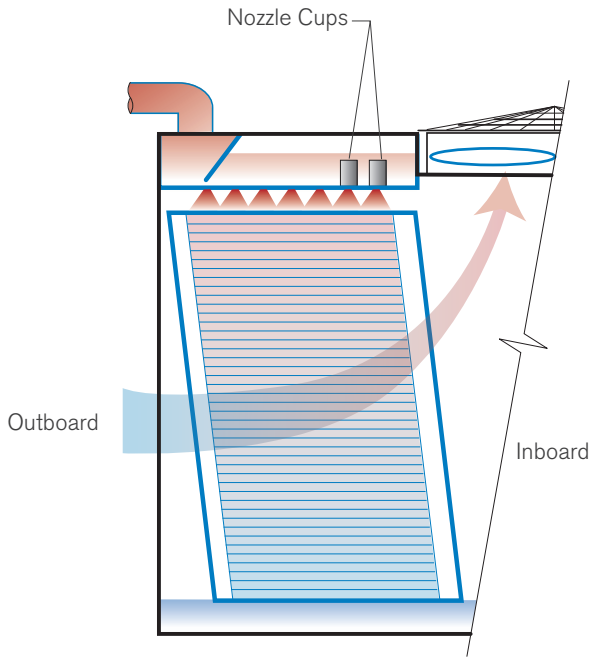


Figure 9 Crossflow water distribution over fill at full flow

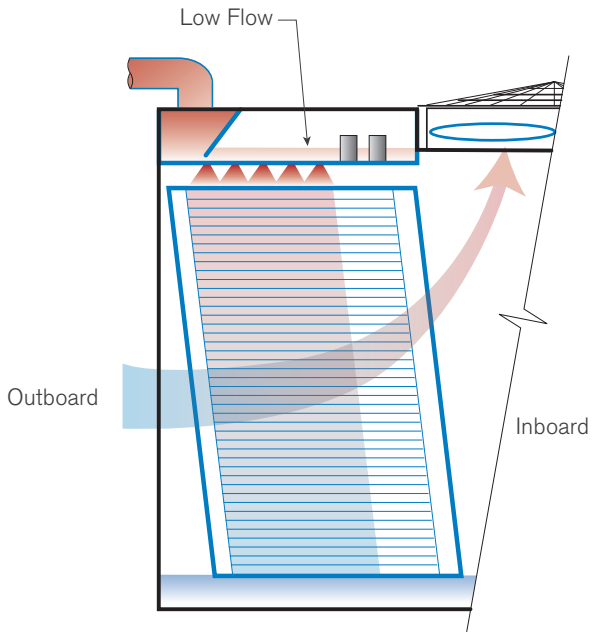


Figure 10 Crossflow water distribution over fill at low flow with the use of nozzle cups maintains even distribution

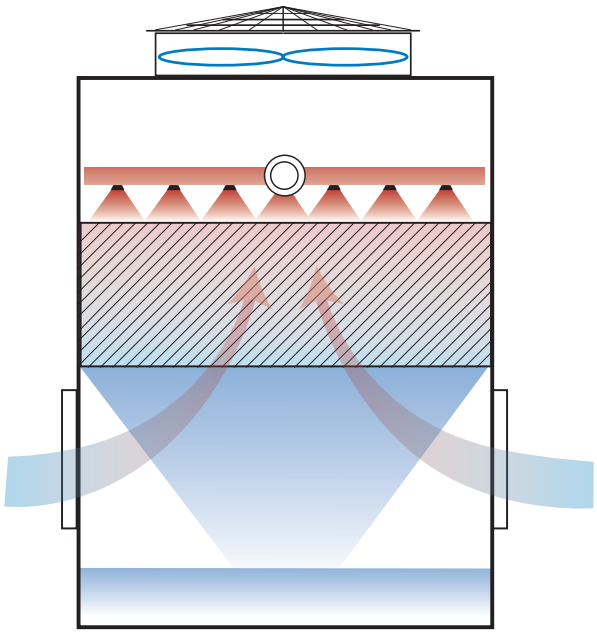


Figure 11 Counterflow water distribution over fill at full flow

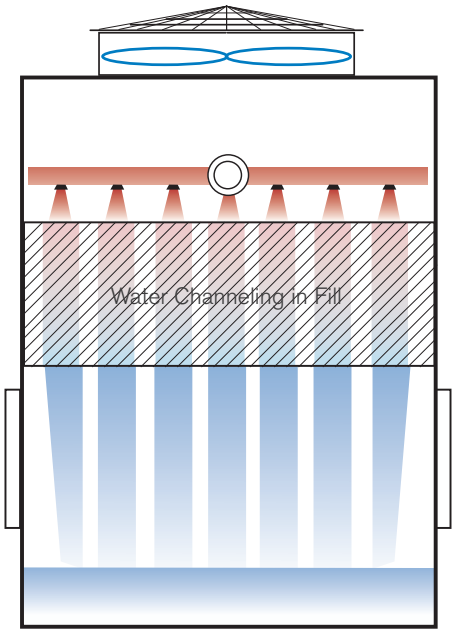


Figure 12 Counterflow water distribution over fill at low flow is channeling which can lead to scale and ice development and unpredictable performance

Summary

In conclusion, crossflow and counterflow are classifications of cooling tower—specifically the method in which the air contacts the water for heat transfer. Both crossflow and counterflow towers have their advantages and the application alone should dictate which type of tower should be used. Crossflow towers will serve better for maintenance access, variable flow, and cold weather operation. Counterflow towers may serve better in tight spaces under 750 tons, or in spaces where lower operating weight is required.

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