What’s New with NEBB?

Title 24
Things are moving along with Title 24. Get the latest update from our Title 24 Chair, Amber Ryman. See page 10.

Chapter News
What is happening with the Northern California/Hawaii NEBB Chapter? See page 9.

Featured Member
Air Balance Hawaii is our featured member this month. To see what is happening with them, see page 7.

This edition is packed with information. Be sure to check it out!
Chilled Beam Systems  *Part 4 by Trane*

Although chilled beam systems have been used in Europe and Australia for many years, they are a new concept to many in the U.S. Those interested in learning more about these systems, as with any new concept, are faced with the task of discerning its true strengths and weaknesses. The goal of this article is to investigate the common claims about chilled beam systems. This is part three.

**Challenges of Using Chilled Beams**

The purpose of this section is to review the challenges associated with applying chilled beams, and some ways to overcome those challenges.

**High installed cost.** Active chilled beam systems often have a higher installed cost than other system alternatives because the chilled beams have a relatively low cooling capacity. This means that more coil surface area is needed to provide the required space cooling. In addition, piping and control valves must be field-installed to deliver chilled water to the beams installed in every space.

Two factors that significantly limit the cooling capacity of an ACB are warm entering-water temperature and low inlet air pressure.

1) The entering-water temperature must be relatively warm (typically between 58°F and 60°F) to prevent condensation. With a warmer water temperature, a higher water flow rate (gpm) and/or more coil surface area is needed to provide the required cooling capacity.

2) The higher the static pressure entering the nozzles of an ACB, the more room air is induced through the coils inside the chilled beam. However, a higher inlet pressure requires more fan power. To keep fan energy use low—and avoid the fan energy penalty that plagued the high-pressure induction systems that were popular in the 1960s and 1970s—active chilled beams are typically selected with an inlet static pressure between 0.3 and 0.5 in. H2O, which is similar to the inlet pressure required by a VAV terminal unit. To induce sufficient room airflow with this low inlet static pressure, the pressure drop for induced airflow through the coil must be very small, which again results in the need for a lot of coil surface area. Returning to the same example, four 6-ft long active chilled beams are needed to offset the space sensible cooling load for this 1000 ft² office space (Figure 11). Notice how much ceiling area is covered with the beams.

![Figure 11. Larger area of ceiling space required for chilled beams](image)

**Example: 1000 ft² office space**

Note: This example is based on two-way, four-pipe active chilled beams. Primary airflow of 360 cfm (0.36 cfm/ft²) is delivered to the beams at 55°F dry bulb and 0.50 in. H2O inlet static pressure. The entering water temperature is 58°F and the waterside ΔT is 5°F. The design space sensible cooling load is 19,500 Btu/h (19.5 Btu/ft²) and the zone cooling setpoint is 75°F.
Figure 12 includes photos of some active chilled beam installations. Notice that 6- or 8-ft long chilled beams are installed almost end-to-end down the entire length of the space, and another row of beams is installed four to six feet over. To reduce the installed cost associated with the beams, system design variables can be changed to reduce the number of active chilled beams required (Table 3). However, these changes are not without consequences. Changing a system design variable often impacts the installed cost, or energy use, of another component in the system.
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For example, increasing the water flow rate through the chilled beam increases its cooling capacity, but also increases pump energy use and requires the installation of larger pipes and pumps.

**Need to prevent condensation**

As mentioned earlier, a chilled beam does not typically contain a condensate drainage system. Because air from the occupied space passes over the cold surface of the coils, the indoor dew point must be maintained below the surface temperature of the chilled beam coil to prevent moisture from condensing on the coil and dripping into the space. Bottom line: chilled beams are for sensible cooling only, not dehumidification.

In ACB systems, the primary air system is used to offset the space latent load and typically maintain the indoor dew point at or below 55°F to prevent condensation. In addition, the water temperature delivered to the beams is typically maintained between 58°F and 60°F, sufficiently above the dew point of the space.

For most applications, maintaining the indoor dew point at 55°F means that the primary air must be dehumidified to somewhere between 45°F and 53°F dew point (44 to 60 grains/lb). Of course, how dry the primary air must be depends on the quantity of primary air delivered, as well as the latent load in the space. If the primary air is delivered drier (at a lower dew point), less airflow (cfm) is needed to dehumidify the space (Table 1).

Similar to the entering water temperature, if the dry-bulb temperature of the primary air is too cold, there might be increased risk of condensation forming on the housing of the ACB.

Even though the primary air system is designed to control the indoor dew point, it is also important
to a) limit the infiltration of humid outdoor air by designing and constructing a tight building envelope and b) control the HVAC system to maintain positive building pressurization during humid weather.

In some climates, indoor humidity can increase overnight or over the weekend. To avoid condensation at startup, it may be necessary to lower the indoor dew point prior to activating the chilled beams. This operating mode, often called "humidity pulldown," requires the primary air system to start prior to occupancy, and operate long enough for the humidity inside the building to reach the desired dew point (55°F, for example) before chilled water is supplied to the beams.

**Risk of water leaks.** Since chilled beams are water-based systems, piping (both supply and return) and control valves must be field-installed to distribute chilled water to multiple beams in every space of the building. This impacts installed cost, but also increases the risk of water leaks due to the increased piping and pipe connections.

As mentioned earlier, active chilled beams are available in either two-pipe or four-pipe configurations. Four-pipe systems can provide better zone-by-zone comfort control because some zones can receive chilled water for space cooling while others simultaneously receive hot water for space heating. But four-pipe systems also require twice as much piping and twice as many pipe connections, which further increases installed cost and increases the risk of water leaks.

Of course, if a VAV system uses hot water heating coils in the VAV terminals, piping and control valves must be field-installed to distribute hot water to each terminal. But there will be fewer pipe connections since a zone served by one VAV terminal would likely contain several chilled beams. And the chilled-water piping need only distribute water to the centralized me-
No filtration of locally-recirculated air. Chilled beams are typically not equipped with particulate air filters. Since the coils are intended to operate dry (no condensation), there may be less concern about preventing wet coil surfaces from getting dirty. But, there is still the concern about removing particles that are generated within the space or brought into the space—on shoes or clothing, for example. Limited heating capability. Active chilled beams can provide some heating capacity by flowing hot water through the coils. But capacity is somewhat limited and it can be a challenge to deliver the warm air at a high enough velocity to force it down into the occupied space. Historically, many buildings with chilled beams have used a separate heating system, such as baseboard radiators or convectors or in-floor radiant heating.

Summary

Although active chilled beam systems have some advantages over all-air VAV systems, some of the claimed advantages are likely being overstated. And, chilled beams present some unique challenges that must be properly addressed in the design and operation of the system. The actual energy use of a specific building depends on climate, building usage, and system design, so it warrants analysis using whole-building energy simulation software. It is the responsibility of the design team to understand the benefits, as well as the challenges, to determine if chilled beams are the right system.

By John Murphy, application engineer, and Jeanne Harshaw, information designer, Trane. You can find this and previous issues of the Engineers Newsletter at www.trane.com/engineersnewsletter. To comment, e-mail us at comfort@trane.com

References.


Air Balance Hawaii located in Honolulu, Hawaii has been providing testing, adjusting and balancing since 1991. Back then there were a handful of TAB firms; Johnson Controls (dba Fluid Engineering Services), Pacific Air Conditioning Services, Independent Test and Balance, and Certified Testing. Test and Balance Corp. out of Florida was the lone AABC firm in Hawaii with Certified Testing being the only NEBB certified firm.

The history of testing, adjusting and balancing (TAB) in Hawaii started with Johnson Controls. The owners of each aforementioned TAB firms all started with TAB at Johnson Controls and then left, starting their own firms. In 1978, Pacific Air Conditioning Services was started by owner Norman Dale. In 1984, Independent Test and Balance was opened by Peter Hirashima and in 1985 Certified Testing was begun by Thomas McGowan.

Back in 1985 most reports were still completed with a pen and paper. Independent Test and Balance was the lone firm using computer printout reports and in 1989, Certified Testing started using the NEBB form format on computer.

Although the technology of test instruments and report presentation has made tremendous improvements from the 1980’s to 2015, the key element of TAB still remains that it is a type of trade that you must keep learning whether it’s a lesson from a project, new types of components, or following the modern day industry changes. The TAB trade is affected by everyone that is part of the HVAC system. Design, equipment and installation all makes a difference in how TAB will be completed. The most important factor in business is outstanding employees and Air Balance Hawaii is no different than any other successful company.

Carey Tomasa, initially an AC/refrigeration mechanic changed his career direction and went to work for Certified Testing as a TAB technician in 1985. Certified Testing at that time was the only NEBB certified firm in Hawaii. Carey worked for Certified Testing from 1985 to 1991 when he decided to open his own business, Air Balance Hawaii.

Air Balance Hawaii is an old school Testing, Adjusting and Balancing (TAB) firm that has been in business for 24 years. Currently they employ 3 NEBB certified professionals, Peter Hirashima (TAB),
Avin Oshiro (BSC) and Carey Tomasa (TAB, BSC, S&V), 2 NEBB TAB technicians, Mike Soberano and Thomas Taylor, and an office assistant, Kelly Kurashige who handles the scheduling, billing and administrative work.

Carey Tomasa first became NEBB TAB certified in 1994, following that up with his Sound & Vibration certification in 1997 and then his Building Systems Commissioning certification in 1999. Carey spends most of his time in the office, occasionally going into the field if needed. Carey felt it was important for his firm to have a certification and NEBB seemed the natural choice. Air Balance Hawaii was the second NEBB certified company in Hawaii.

Peter Hirashima has extensive background doing balancing work first starting in 1978 with Johnson Controls and then owning his own balancing firm. He became NEBB TAB certified in 2000. Peter works mainly in the office with occasional field work when required.

Avin Oshiro has been a mechanical design engineer for 35 years before joining Air Balance Hawaii. Avin is Building Systems Commissioning NEBB Certified, earning his certification in 2013.

Office staff from left to right: Kelly Kurashige, Carey Tomasa, Mike Soberano, Avin Oshiro and Peter Hirashima
I hope all is well. Business seems to be doing very well for many. San Francisco has many cranes up and going. The South Bay has Apple/Google/Facebook and many new Shell/Core projects and Sacramento has the Kings projects. Hopefully this work is represented in your business too.

Title 24 is changing as quickly and as slowly as we suspected. What I mean is that some areas are requiring the testing by an ATT which has our phones ringing. But the CEC is also changing as represented in the recent email from NEBB regarding the CEC changes. The requirement of 300 certified ATT has not been met yet but progress is being made. You need to keep up on the changes and status.

Keep in touch with Audrey. In Vic’s absence, Amber Ryman has stepped up to be our Board of Director representative since the National meeting.

There were many subjects discussed at the National Annual meeting but none more than all the ANSI changes. NEBB is currently proceeding with accreditation of the CX-PP DOE-based commissioning certification program. The next discipline to get certified is our TAB CP program; that application is in process and the JTA (job task analysis) for that program is scheduled to begin in September. Our Standards Council is proceeding with development of an ANSI-Accredited Procedural Standard for Technical Commissioning of New Buildings (BSC) and an additional Standard for Technical Retro-Commissioning of Existing Buildings (RCX-EB). Upon completion of those Standards, the BSC and RCX-EB programs are slated to pursue ANSI accreditation. We will keep you informed as we are notified.

Your Board of Directors is still waiting to hear from National about our new fee structure. Your Board of Directors need to look at some drastic Chapter budget cuts due to these changes coming down the pipeline. We are looking at changing our office option again with a focus on the virtual office and leased space on a for need basis. The fixed office is always a plus but is being trimmed back.

I would like to personally thank MTB for looking into a ME (15,000, Inc) and their specification that used to limit NEBB members. We appreciate the time you spent to help.

Until next newsletter.

Steve Smith
Chapter President

We lost two good members this year.....

This year has seen a real loss to our good friends at NEBB. On March 5th, we lost Bill Jeffrey and on June 4th, we lost Vic Congi. Both men have been instrumental in our organization and industry on many levels.

Bill Jeffrey has had a long history with our local industry. Bill spent the last 20 years at DPR as a MEP coordinator and kept us all on our toes. Most people would have retired by his age but not Bill. Bill retired sev-
eral times but was drawn back in because everyone wanted to work with Bill. Even on our local NEBB board, we could always count on Bill being there with that smile on his face and Texas twang. Bill influenced so many of us and will be greatly missed.

Vic Congi left us too early in life. For the many of us that knew him, learn from his life and make the most of it, especially with your families. Vic was a busy man and was our local representative regarding the Title 24 changes these last few years along with many positions on our Board of Directors. Vic gave us his all as represented in his presence at the National Convention right before our loss.

We will all miss Bill and Vic. I hope you can take a moment in your busy day and reflect on their contributions to your businesses and hopefully friendships. I know the Board of Directors and I will miss them and appreciate the time we had together.

Thank you Bill and Vic. We will miss you.

Steve Smith
Chapter President

Title 24 Status Report

"NEBB is currently finishing the application process with California Energy Commission. The application process is a lengthy adventure and many details go into finalizing the product. There were many pieces to this puzzle and with the leadership of the late Vic Congi, assistance from help of ESCO, NEBB, the Southern California Chapter, as well as our own Chapter we would not be where we are today in the process.

I thank everyone that has contributed their time and energy to getting us one step closer to the end result of becoming an Acceptance Test Technician Certification Provider (ATTCP). We are almost there."

Amber Ryman
Title 24 Chair
NEBB Announces New Process Commissioning Certification

NEBB is pleased to announce the new Commissioning Process Certified Professional Program. The NEBB Commissioning Process Certified Professional (CXPP) certification will be DOE recognized; all certificants will meet any specification calling for "certification recognized by the Department of Energy through its Better Buildings Workforce Guidelines project". NEBB has submitted its preliminary application for ANSI Accreditation of this program.

Why is the certification important?

DOE Recognition: NEBB used the Commissioning Professional Better Buildings Workforce Guidelines Certification Scheme and will be achieving accreditation under ISO/IEC 17024. The Department of Energy (DoE) and General Services Administration (GSA) will recognize our CXPP certification as high quality, industry endorsed, and nationally recognized.

Why will this credential be specified in the near future?

The purpose of the Better Buildings Workforce Guidelines is to assist certification programs, workers, employers, building owners and managers, energy efficiency program administrators, and government officials in developing and identifying a more consistent and comparable workforce.

Proliferation through Authorities Having Jurisdiction (AHJ) Requirements: Market demand for a high-quality workforce through government and industry recognition of accredited workforce credentialing programs. For example: local AHJ commissioning ordinances, Federal Buildings Personnel Training Act, employers, building owners, certification programs, and more.

Will this certification replace the existing NEBB Technical Commissioning Certifications?

No. NEBB’s Technical commissioning programs are in addition to this certification. There is no Firm Certification available for the CxPP program at this time.

Exam Package Description

The exam package has a combined value of over $860 and includes the CxPP Sourcebook; the application fee; and the cost of the exam. The Sourcebook is a collection of source material and includes the Candidate Handbook as well as the following industry publications:

- ASHRAE Standard 202
- ASHRAE Guideline 0
- ASHRAE Guideline 1.1
- ASHRAE Guideline 1.5
- ASHRAE Guideline 0.2 (when published by ASHRAE)

Resources

Download the handbook: NEBB Commissioning Process Certification Package

For more information, please contact Sheila Simms, Certification Manager at sheila@nebb.org or 301.591.0483
Upcoming Events

NEBB CLEANROOM PERFORMANCE TESTING AND OPTIONAL EXAM FOR CERTIFIED PROFESSIONALS

September 28 - September 30, 2015
Holly Springs, North Carolina

Contact the NEBB Office to sign up or to receive more information at www.nebb.org

NEBB FUME HOOD TESTING SEMINAR FOR CERTIFIED PROFESSIONALS

September 28 - October 2, 2015
Labconco
Kansas City, Missouri

Contact the NEBB Office to sign up or to receive more information at www.nebb.org

NEBB BUILDING ENCLOSURE TESTING CERTIFIED PROFESSIONALS

October 21-23, 2015
All Day Event
Chicago, IL

Contact the NEBB Office to sign up or to receive more information at www.nebb.org

NEBB SOUND AND VIBRATION CERTIFIED PROFESSIONALS SEMINAR AND EXAM

October 24-28, 2015
Deerfield Beach, FL

Contact the NEBB Office to sign up or to receive more information at www.nebb.org

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