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2022 - Quarter 2

Cover Story

Why We All Need to Pay Attention to Title 24







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For the past several years, NEBB has held the Annual Conference in the middle of the President's term, so by now, this article would typically be thanking everyone for a great conference, a lot of hard work, and then reminiscing on the great times had by all. Due to COVID, and all the cancellations and delays that took place through 2020 and 2021, we have landed back in the fall, and this year we will hold our Annual Conference in Charleston, SC, November 3rd through the 5th. Now, as I write this article, there are many people hard at work preparing schedules, events, travel, and technical sessions, while sponsors are gearing up to bring you the most advanced tools and software ever seen.

This year, we are taking advantage of this calendar shift by holding a mid-year meeting once again. Here, all of the Technical Committees, Board of Directors, and NEBB Staff will meet face-to-face for team building, committee meetings, collaboration across committees, and learn new and exciting things about our organization. I mentioned several NEBB projects that are underway in my last article. It is our hope that being together face-to-face will provide us with the much-needed coordination and teamwork that is required to get these projects across the finish line.

The NEBB Learning Center (NLC) is being populated currently with technical seminar materials, short self-driven courses, and video content. When the committees meet, they will be able to work together on projects that will serve multiple disciplines and multiple skill levels. As the NLC grows, it is sure to become the one-stop-shop for all NEBB Certified individuals to obtain information, learn new things, and keep up to date with industry news and insight. I am excited to watch these groups work together to make NEBB better.

Between the mid-year meeting and the Annual Conference, NEBB Committees will continue to work on their publications, seminars, and NLC products, while also holding in-person seminars across the country.

Even though the world has learned to cope with online meetings, eLearning, and remote Zoom meetings, there is still a need for in-person learning – both classroom work and hands-on labs. We look forward to providing both methods of learning as we move into the future, meeting you where you learn the best.

In Charleston, we expect a fantastic turnout, great food, and some highly technical sessions to provide your required CECs. I think the thing I look forward to the most at a conference is getting to meet and spend time with our vendors, and learning more about their tools, equipment, and software, without which we could not do our jobs. Spending time with these manufacturers, engineers, and software designers will allow you to provide instant feedback to them and have them show you things you didn't know your equipment could do. These people truly have the hearts of teachers. They will do what it takes to get you what you need, and they will quickly become friends for a lifetime. If you have never attended one of our Annual Conferences, you should strive to make 2022 your first time.

I hope to see you all in November! Come ready to eat and to learn. And most importantly, come to have a great time! See you all soon!

Jon

Jon Sheppard *NEBB President*



Durante los últimos años, NEBB ha realizado la Conferencia Anual a la mitad del periodo del Presidente de NEBB, por lo que, a esta altura del año, este articulo sería típicamente para agradecer a cada uno por una gran conferencia, mucho trabajo duro y recordando los grandes momentos vividos por todos. Debido al COVID, y a todas las cancelaciones y retrasos que tuvieron lugar durante 2020 y 2021, hemos vuelto nuevamente al otoño, y este año tendremos nuestra Conferencia Anual en Charleston, SC, del 03 al 05 de noviembre. Ahora, conforme les escribo este artículo, hay muchas personas trabajando duro para preparar cronogramas, eventos, viajes y sesiones técnicas, mientras que los patrocinadores se preparan para traerles a ustedes las herramientas y equipos, así como los programas de software más avanzados que se hayan visto.

Este año, estamos tomando ventaja de este cambio en el calendario para tener nuevamente una reunión de medio año. Aquí, todos nuestros Comités Técnicos, Junta Directiva y el Staff de NEBB se van a reunir en persona (face to face) para realizar sesiones de desarrollo del equipo de trabajo, reuniones de comités, colaboración entre comités y aprender cosas nuevas y excitantes de nuestra organización. En mi último artículo mencioné muchos de los proyectos de NEBB que están siendo ejecutados. Es nuestra expectativa que estar juntos de forma presencial (face to face) nos permitirá tener la coordinación altamente necesitada y el trabajo en equipo que es requerido para lograr llevar estos proyectos a cruzar la línea de meta.

El NEBB Learning Center (NLC) está siendo adecuado y poblado con materiales de seminarios técnicos, cursos cortos auto-dirigidos, y contenido de video. Cuando los comités se reúnan, podrán trabajar juntos en proyectos que van a servir a múltiples disciplinas y múltiples niveles de habilidades. Conforme el NLC crezca, estamos seguros que se convertirá en una única parada (one-stop-shop) en la que todos los individuos certificados NEBB podrán obtener información, aprender nuevas cosas, y mantenerse actualizados con las noticias y visión de la industria. Estoy emocionado de observar a estos grupos trabajando juntos para hacer a NEBB mejor.

Entre la reunión de medio año y la Conferencia Anual, los Comités de NEBB van a continuar trabajando en sus publicaciones, seminarios, y los productos del NLC, mientras que estaremos llevando a cabo seminarios presenciales a lo largo del país. Aun cuando el mundo ha aprendido a lidiar con las reuniones en línea, aprendizaje electrónico (eLearning) y reuniones remotas vía Zoom, siempre existe una necesidad para el aprendizaje en persona, tanto en clase como en laboratorios prácticos (hands-on). Esperamos proveer ambos métodos de aprendizaje conforme nos adentramos en el futuro, encontrándonos con usted en el punto ideal donde aprenda de la mejor forma.

En Charleston, esperamos una asistencia fantástica, excelente comida, y algunas sesiones altamente técnicas para proveerle sus CECs requeridos. Creo que la cosa que más espero de una conferencia es congregarnos para reunirnos y pasar tiempo con nuestros patrocinadores, y aprender más acerca de sus herramientas, equipos y diseños de software, lo que les permitirán proveer retroalimentación instantánea a estos participantes y que, a la vez, ellos le muestren a usted las cosas que no sabía acerca de lo que los equipos pueden hacer. Estas personas realmente tienen el corazón de un maestro o profesor. Ellos harán lo que sea necesario para darle lo que usted necesita, y rápidamente se convertirán en amigos para toda una vida. Si usted nunca ha asistido a una de nuestras Conferencias Anuales, debería esforzarse en hacer del evento de 2022 su primera participación.

iEspero verlos a todos en noviembre! Lleguen preparados para comer y aprender. iY lo más importante, lleguen preparados para pasar un gran momento! iNos vemos todos pronto!

Jon

Jon Sheppard *Presidente de NEBB*

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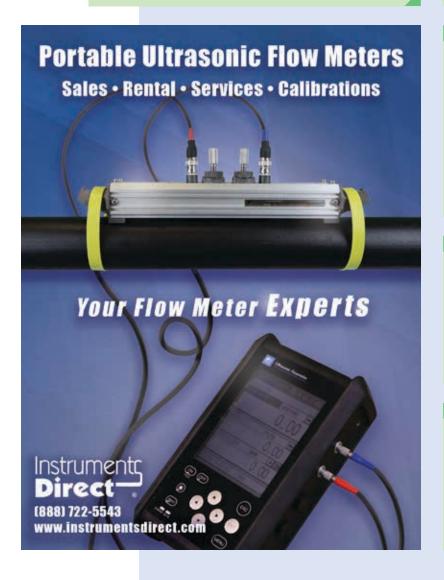
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Jeff Schools is the Past President of NEBB and has taken the new role of the NEBB Technical Director.



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Energy is a hot topic, and the California Energy Commission's Title 24 Standard is no exception.

In its 2015 Assessment of Energy Technologies and Research Opportunities, the U.S. Department of Energy stated:

The buildings sector accounts for about 76% of electricity use and 40% of all U.S. primary energy use and associated greenhouse gas emissions, making it essential to reduce energy consumption in buildings in order to meet national energy and environmental challenges and to reduce costs to building owners and tenants. Opportunities for improved efficiency are enormous.

When zooming in to look at how California is pioneering this charge at the state level, California Title 24 Building Energy Efficiency Standards take the spotlight. Title 24 exists to regulate California's Energy Efficiency Standards for residential and nonresidential buildings. According to the California Energy Commission (CEC) website, California's energy code is designed to reduce wasteful and unnecessary energy consumption in newly constructed and existing buildings.

While Title 24 includes 12 different parts in its entirety, it is Part 6 which regulates building energy efficiency in newly constructed projects, additions and alterations of both residential and nonresidential buildings. Title 24, Part 6 is updated every three years, with subsequent revisions focused on building on efficiency goals

and implementing new technologies or processes as they apply.

"The intention of Title 24 is to help uncover energy inefficiencies where energy grid usage is more than it needs to be," explains Curtis Worley, EVP of Pacific Test and Balance, Inc. "Part 6 is the portion that applies to NEBB."

Title 24: 1978 to Today

California's Title 24 was initially enacted in 1978 as a means of unifying all building standards under a single code to help ease the process for architects, engineers, and contractors. By 1988, Title 24 applied to all occupancies in the State of California.

Although Title 24 requirements are nothing new, some notable changes have been in the works for nearly a decade. Since the enforcement of the 2005 Building Energy Efficiency Standards, technicians have been required to perform acceptance testing for non-residential buildings. Technicians have had the opportunity to become trained and certified in performing

and documenting acceptance testing for lighting controls and mechanical systems for non-residential buildings since 2013.

At a meeting held on April 14, 2021, the California Energy Commission unanimously approved the requirement for using certified acceptance test technicians for Title 24 Acceptance tests to be performed statewide after October 1, 2021. This means the Acceptance Test Technician (ATT) must be certified by a certification provider. The Certified ATT is responsible for performing testing for HVAC systems and controls when the mechanical equipment is required to meet specific energy efficient processes.

"For example, a five-ton packaged AC unit may now need an economizer,

depending on the climate, in order to meet requirements," states Amber Kelly, TAB Superintendent at ACCO Engineered Systems.

If non-certified forms are submitted, they will not be accepted and will likely hold up the permitting process, causing project delays. Contractors that cannot submit certified forms and are found to be holding up the Temporary Certificate of Occupancy can also face costly contract fees.

"The nuts and bolts haven't been changed. The difference is that, before, CEC inspectors received handwritten forms with no proof of competency; now those people need to be certified. Acceptance forms were not being performed properly or at all, which even resulted in some falsified documents previously," relays Worley.

Holding some of the same responsibilities as a county inspector, an ATT is classified as an inspector and is required to prove systems operate as intended and comply with energy efficiency requirements. Now, an ATT can be held under federal penalty of perjury if tests are falsified.



How is Title 24 Relevant to NEBB?

In order to pursue certification, a technician must first select one of the certification providers approved by the State of California. Currently, the certifying bodies include NEBB, Refrigeration Service Engineers Society (RSES), National Energy Management Institute Committee (NEMIC), and the California State Pipe Trades Council (CalPipe). The process of ATT certification and forms that will be taught depend on the certification provider. However, it's worth noting there is a written as well as hands-on component to all certification processes.

"You're taught how to fill out the forms and what to look for on the job. If you've been doing it right all along, there should be no surprises. Any technician working in HVAC will have no problem. If anything, it helps weed out the bad contractors," affirms Kelly. "In years past, it was not unheard of to find thermostats programmed incorrectly or economizers not plugged in at all previously. This is California's way of ensuring the systems do work right from the beginning and that there's enough ventilation in your building."

"These new changes ensure competency, as well as serve as gatekeepers in getting a Temporary Certificate of Occupancy or Certificate of Occupancy," expresses Worley. Once an employer is certified and has a Certified ATT on staff, they may perform Title 24 testing for the forms in which they are certified. This can translate to greater opportunities and potential work. An ATT goes through technician certification, while a Certified Acceptance Test Employer (ATE) is a company that states it will handle the records to ensure

work is performed by certified individuals. By certifying technicians, NEBB is responsible for testing and quality control and dealing with any complaints.

NEBB's ATT Certification Process

There are 19 different acceptance tests that can be required through Title 24 depending on one's job function. However, not many technicians deal with all 19 of those tests. It's understandable that a technician may not want to give up the time and resources required to study all the associated forms for testing they will never perform.

With that in mind, NEBB has grouped some of the most popular testing combinations in packages. The packages were created to accommodate the different ways professionals work with Title 24 and what forms they use most to prevent having to learn or pay for unnecessary forms. For example, one is for packaged units, one is for water systems, another for controls, and so on. NEBB's ATT packages can be viewed at: https://nebb.org/technician-certification/.

While some trade associations may pay for members to become certified, the process can be a lengthy one when other certification providers require technicians to become certified in all 19 forms. Because NEBB allows technicians to select specific forms to be certified in, the amount of time to train is fairly short. Once certified, NEBB grants the ATT access to the selected forms.

"The process is way faster than the other organizations," Kelly suggests. "Through NEBB, technicians

take an online test to prove experience, then an online course specific to that form, then hands-on at Brownson Technical School in SoCal, pay your fee, take the test, and you're certified!"

NEBB also has reciprocity written into its program. "That means if you're certified via NEMIC, RSCS, or CalPipe, you can apply and bypass training to be certified via NEBB's program," states Kelly. "That way, you can use any and all of the registries you're certified in. If using NEBB, it helps to simplify things because we can then do everything in one place."

How are Title 24 Changes Affecting the Industry?

Due to the length of the construction cycle typically taking between six months to two years, projects already permitted, are not required to go through the new Title 24 process. Compliance with Title 24 began with any projects that required permitting after October 1st of last year.

"That is one of the reasons we're not seeing Title 24 in full effect at the moment. However, we expect new buildings will increase the number of projects working to meet Title 24 compliance in time," states Worley.

Although Title 24 is part of the state's energy code, it is enforced by local jurisdictions. Different cities and counties have taken different pathways to enforcement. Many inspectors and building officials are not trained yet, so the process is not being followed everywhere.

"Metropolitan areas like San Francisco and Los Angeles were some of the first the embrace Title 24. In San Francisco alone, thousands of forms have been turned in on projects. However, some other areas seem to be taking a wait and see approach," Worley describes.

"The state has lacked training and enforcements of it, but people are starting to pay more attention. We've been talking about this since the 2013 code cycle," clarifies Kelly. "Still, some are taking a 'we'll do it when we have to' approach. But others, like ACCO, have been proactive about certifying people."

"Title 24 isn't about making it work. It's about proving that it does," declares Kelly.

In the coming months, NEBB's Title 24 Committee plans to offer continuing education credits to inspectors through the NEBB Learning Center. Both Kelly and Worley serve on NEBB's Title 24 Committee. Through an online course, they aim to explain what inspectors should be looking for to help provide training.

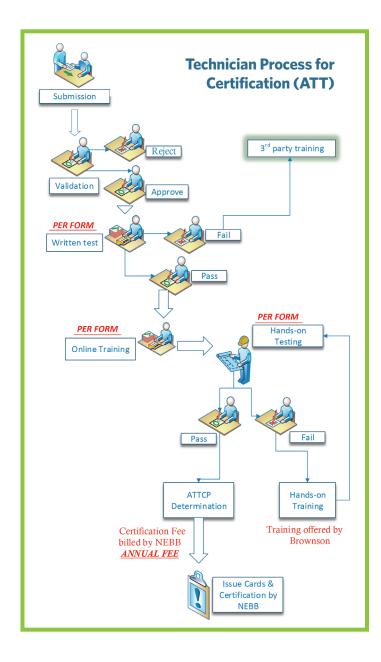
Why Should Contractors Outside California Care?

With the overall goal of increasing energy efficiency, California gains several opportunities. These efforts not only save costs for building owners in terms of lower utility usage, but can also free up space on the grid for other initiatives and accommodate population growth.

"Efficiency savings can be used to power up vehicles and power up the grid. For example, if we can increase efficiencies by ten percent, we have the potential to offset the costs of going to all electric vehicles," states Worley. "We need capacity across the system. There's a limitation to what can be produced and provided via the current infrastructure."

"Title 24 isn't about making it work. It's about proving that it does," declares Kelly. "It ensures occupancy safety and with outdoor air requirements, and ensures people have enough fresh air indoors."

Presently, most states look to ANSI/ASHRAE/IES Standard 90.1 for guidance on ventilation and energy efficiency in commercial buildings. States such as Florida, lowa, New York, and Virginia use this standard via International Energy Conservation Code (IECC) as a commercial energy code, while others like Alabama,



Benefits of NEBB's ATT Certification Program:

- Quick three-step process. Obtain certification in days, not months.
- Reciprocity of certification via others certification providers.
- Ability to certify in specific forms. No need to study forms that will go unused.
- Certification process is open to all.
 Technicians are not required to be an existing member.

Indiana, Louisiana, Mississippi, New Jersey, Oregon, and West Virginia have adopted it directly.

Because California often serves as a pilot program for the rest of the United States, out-of-state contractors may want to keep an ear to the ground. As we've seen in the past, what happens in California is often mirrored by other states over the next decade. Some say California is the guinea pig, yet others believe the state is just ahead of the curve. Either way, this can be a very beneficial thing for other states that can use California's "pilot" projects for lessons learned in order to streamline, refine, and tailor to their own efficiency efforts.

"Title 24 helps to monitor the energy efficiency of HVAC equipment in California. It's currently not a program in other states, but if it goes smoothly, that is a likely result," states Kelly.

"Although it is a state mandate now, it could be become federally mandated in the future," agrees Worley.

Another great reason to pay attention is to capitalize on business opportunities. There are opportunities related to both Title 24 Acceptance Testing work, as well as commissioning.

"It's a business opportunity for those outside of California that want to get certified and come out just to do the Title 24 portion of the job. There's a market for that now that it's required," depicts Kelly. "And because it's pass/fail, if it fails, you can get paid to come back."

In terms of commissioning, some people have been portraying Title 24 compliance as a type of step-by-step commissioning. "It does not take the place of commissioning at all because commissioning is broader picture with more details," explains Kelly. If anything, this is actually an opportunity for third-party commissioning agents because commissioning is required for projects of a certain size and complexity.

For more information on how to take advantage of these opportunities and become certified, visit NEBB's website at www.nebb.org.

CASE STUDY: Audible Tonal Noise from Chiller

By Stuart McGregor

The article describes a complaint-based noise problem, in a residential building, from an unknown mechanical source, which was determined to be a chiller housed located in an interior mechanical room.

Background

I was called in to investigate the source of an audible sound tone in several residential units in a 5-story residential building. The first floor is enclosed parking, with 4-floors of residences above, and a 3rd floor mechanical room on one end of the building. The building was new construction, occupied for about 1-year, and the noise complaint surfaced at the beginning of summer when air conditioning was first needed. Additionally, the building is a concrete structure.

There are several big clues in the description above; one, the noise complaint did not occur during the winter months, so initially it is most likely associated with some equipment which only runs when cooling is required, two, new construction, which means some piece of equipment was installed and had not been run during the summer months, except during the previous summer during building commissioning, when no residents lived in the building, and three, a concrete structure, concrete structures readily transmit vibration and hence sound well over large distances.

An aside: Tonal or discrete sound noise complaints are much harder to successfully address than broadband noise issue. The reason is that the character of tonal noise is so different from other background noises that the tone must be significantly reduced in order for the complaint to go away.

Measurements

During the initial site visit, I was accompanied by the building maintenance director, and we went to talk to the resident complaining of the tonal noise. Immediately upon entering the residence I could hear the tonal sound. I then asked everyone to be quiet, and made two sound level measurements, one, with the chiller on and the second, with the chiller off. The results of these measurements are shown in Figure 1. Inspection of Figure 1 clearly shows a sound level peak, with the chiller on, in the 250 Hz 1/3-octave band.

We then went to the mechanical room and made vibration measurements on the chiller. Results of these measurements are shown in Figures 2 through 5.

Figure 2 shows vibration levels measured on the chiller, on the flange between the drive motor and the compressor.

Figure 3 shows vibration levels on the chiller discharge piping.

Figure 4 shows vibration levels on the chiller side of the inertia base vibration isolators.

Figure 5 shows vibration levels on the housekeeping pad side of the vibration isolators.

Analysis

This case was unusual, in that, the culprit noise source was easily identified and all parties, the resident, the building facility manager and myself could all hear the noise and could all hear it stop when the chiller was turned off. There was no way the building facility people were going to get out of this one.

Sound level data:

Figure 1 - clearly shows that there is a tonal or very narrow band, sound causing the complaint. Inspection of

Figure 1 shows that the 250 Hz 1/3-octave band sound levels are 23 to 24 dB higher than the 200 and 315 Hz 1/3-octave band sound levels. This is a significant levels of sound to mitigate. As an aside, in order to successfully mitigate tonal noise levels, the tone must be reduced to at least then levels of the sound levels of the two adjacent side bands. Otherwise, because the character of the tone is so different from other background noise levels, the tone will still be audible.

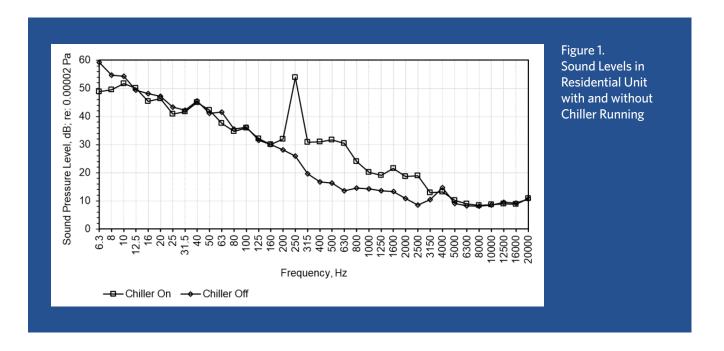
Vibration data:

Analysis of the vibration data is a bit more complicated than the sound level data.

Figure 2 – clearly shows a strong vibration peak at 238 Hz, which is in the 250 Hz 1/3-octave band (for sound data). The chiller motor was operating at ~30Hz, so this 238 Hz peak is six times the operating speed of the motor. The chiller vibration levels are in the ASHRAE Severity range of Fair to Slightly Rough.

Additionally, there are two small peaks near 40 and 60 Hz, which at the 1-times and 2-times of the drive motor speed. The vibration levels are in the ASHRAE Severity Smooth range and not a concern.

During initial inspection of the chiller, it was disclosed that the chiller had been installed during construction,

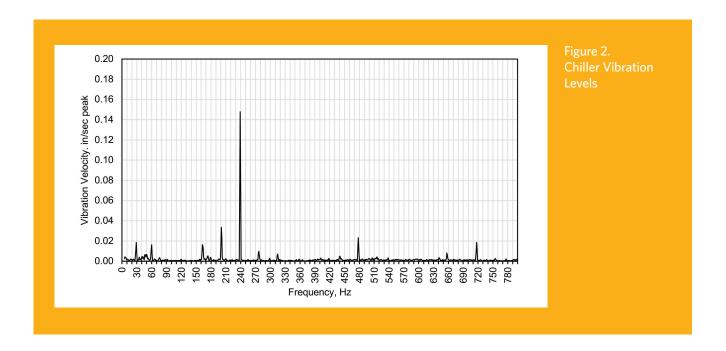


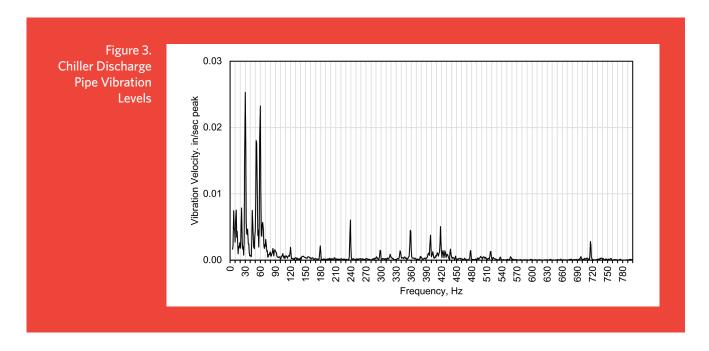
had not been run for ~ 1-year and had not been periodically rotated. Storage of motors and pumps requires them to be rotated a minimum number of revolutions at periodic intervals and stopped at different angles of revolution, to minimize damage to rolling elements.

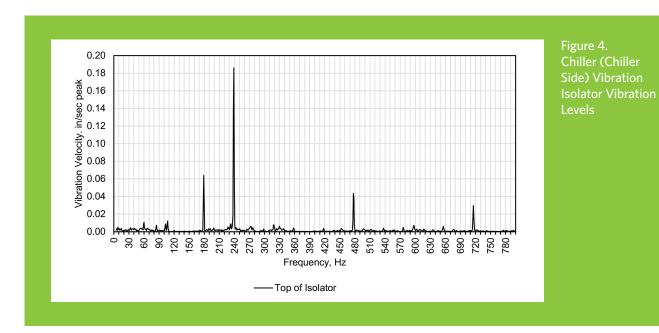
Figure 3 – shows measured vibration levels measured on the discharge piping. Notice that the 238 Hz vibration peak is still present, although more than an order

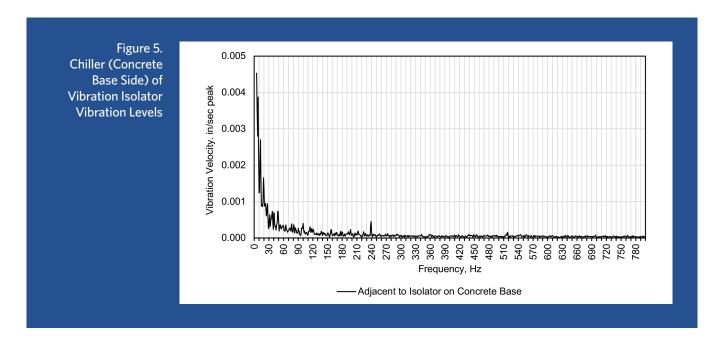
of magnitude lower than on the chiller. This does not rule the piping as the transmission path, because small vibration levels can lead to clearly audible sound levels.

Figures 4 and 5 – show vibration levels on each side of the spring vibration isolators. Notice the amplitude difference between the chiller side of the spring and the base side of the spring. This shows that the spring isolators are functioning as designed and providing over 95%.









An aside: Making vibration measurements on both the equipment side and the building side of an isolator is always important, to show that the vibration isolators have been property sized and installed. Visual inspection will show proper installation, it will not necessarily show proper sizing.

A bit of caution at this point. While, the data shows the spring isolators are providing significant vibration isolation, the isolator may still be part of the transmission path, ONLY, because the background sound levels inside the residential unit with the chiller off are so low, in the range of 26 dB in the 250 Hz 1/3-octave band.

Mitigation

The analysis above has identified the source of the tonal noise heard in the residential unit and there are several ways to mitigate this tonal noise; reduce the

vibration level of the driving force (the chiller defect), install vibration isolation in the intake and discharge piping and last install more effective vibration isolation between the chiller and the building structure.

First - reduce the vibration level of the driving force, the chiller defect. Reducing the driving force will reduce the transmitted force and energy that goes into the building structure. In this case remove the drive motor, inspect and if needed replace the drive motor bearing, and then inspect the bearings or bearing elements in the compressor.

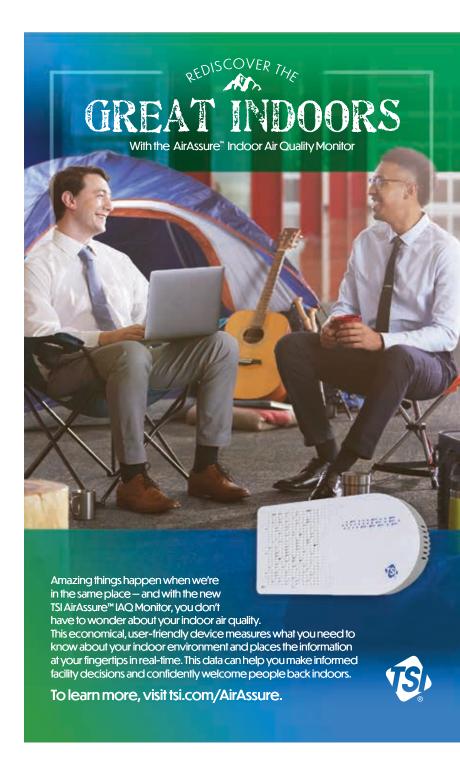
While, this is the obvious first step, it is also expensive, and there may be other two options may be sufficient. In this case, the building owner decided to try the other options first.

Second – install vibration damping elements in the discharge and intake piping. In this case, the initial design had a typical spherical isolator; which, are typically installed more for alignment than vibration isolation. Piping vibration isolation looks like a U or V-shaped loop, perpendicular to the pipe axis, with two braided steel flexible sections. In this case, the owner has opted to try this solution first.

Third - install more effective vibration isolation between chiller and the building structure. There are situations, especially with concrete structures, that spring or neoprene isolation elements are not sufficient, even with very high isolation efficiencies. In these cases, the only solution is to install pneumatic isolators, in place of a typical spring isolator. The cases where pneumatic isolators are needed, is where the background sound levels are very low; as in this case or in cases where spaces require very low noise levels.

Summary

While, the initial measurement data pointed directly to the source of the noise complaint, im-



plementing a solution has been hampered by cost concerns. The building ownership has chosen to use the second isolation method, in hopes this will be sufficient. As I write this article, the second option has been installed, over the winter months, and we are waiting for warm enough weather to operate the chiller. Hopefully, no additional bearing damage has occurred over the winter months.

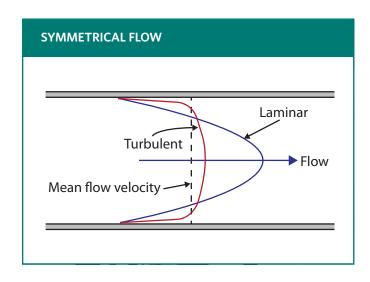


AND THEIR EFFECT ON ULTRASONIC FLOW METERS

By Brent Baird

The novelty of an ultrasonic flowmeter is the ability to measure flow by clamping or handholding it on the outside of a pipe. Pretty amazing! In fact, because of this magical flow monitoring method of operation, some people think it works on every application. Well boys and girls, this is still a flow meter. And like all flow meters, they have some basic requirements. One such requirement for the optimum performance of a clamp-on ultrasonic transit time flow meter is that it needs some straight run of pipe. So, let's review the liquid's flow hydraulic requirements.

The perfect application would have a symmetrical flow profile. The illustration on the right looks similar to a top-down view of a motorboat going down a river. The flow is fastest at the center and, due to friction, slowest where the wake is cascaded out towards the sides. In fact, this illustration is a pipe cutaway with the liquid flowing from left to right. The blunt or elliptical shapes constitute Reynolds numbers where they represent turbulent and laminar flow rates. One common denominator is that, due to friction, the fastest flow is located in the center of the pipe and slowest near the pipe wall. This type of symmetrical flow normally occurs when the application has 10 pipe diameters after an elbow and 5 pipe diameters



before the next obstruction (for traditionally pumped applications which usually have a flow rate of @7 ft/sec). If you were to install your flow meter sensors with this symmetrical flow profile, the ultrasonic signal would traverse the pipe and take an average cross section of the velocities to calculate the optimum flow performance.

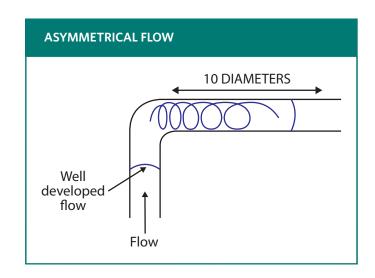
The opposite of a symmetrical flow profile is referred to as an asymmetrical flow profile. Some people refer to it as a turbulent flow application. In this illustration on the left, the flow travels up a pipe and through an elbow. The distance on the inside of the elbow is shorter than the outside of the elbow. Hence, why the flow tends to tumble

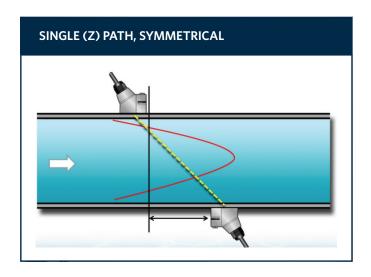
from the discharge. If you are to install your flow sensors after this elbow, you will typically get a fault condition or no indication of flow.

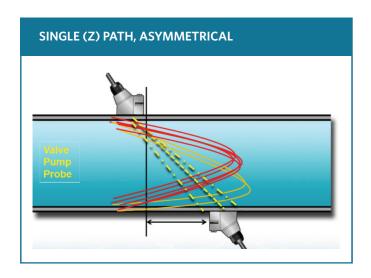
The ultrasonic transit time flow meter uses a math equation to determine the correct transducer spacing. Once you program your flow meter with the pipe's OD, ID, material, and type of liquid, it will calculate the correct transducer spacing to use; taking account the 10 + 5 pipe diameters of straight run of pipe (for a symmetrical flow profile). The transducers transmit signals back and forth utilizing an average mean velocity to calculate the volumetric flow. Under these conditions your flow meter will offer optimum accuracies and performance. Although this type of installation works properly in the laboratory, it may not be the case in the field.

Should you not have the required straight run of pipe, it could affect your success of monitoring an application. In this case, having a short run of pipe could cause interrupted flow patterns from an inline obstacle and the trajectory of the ultrasonic signals can miss the receiving transducer. If this is marginal, it might would require prospecting the transducers spacing to establish the signal. Once this (not in the manual) procedure is used, you may not obtain the optimum accuracy of your flow meter. In applications where there is turbulence, short run of pipe, or large amounts of suspended solids/aeration, the transducer signal may get blocked from being received. This would result in a fault or, better know as, signal error indication. This would indicate that you have no flow data to read.

So, how does one address this run of pipe situation in a typical field installation? The rule of thumb is to try to search out the best possible location with the required straight run of pipe. If not available, then use the 2/3rds rule: When you have limited straight run of pipe, attempt to clamp your transducers downstream 2/3rds of the available straight run of pipe and install your transducers. If that does not work, then you will need to prospect your transducers for a signal connection. Today's ultrasonic flow meters signal









strengths are more of a, "Yes" or "No". So, there is no longer a need to monitor the % or signal strength bars. If you get a signal, run with it.

As I indicated earlier, just like every other flow meter technology, clamp-on ultrasonic flow meters require a set of specifications. And if you can't meet the specifications, the flow meter did not fail, the application was not suitable for it. Should you get in your vehicle and drive hundreds of miles to create a flow survey and you get an application like this pictured

on the right.... Don't bother trying it! There is no point in showing your customer a flow meter that doesn't work. It destroys your credibility and the confidence in the technology. If the customer really wants to monitor this application, then they will bring out the backhoe to find you some straight run of pipe!





This month's War Story would be in relation to multiple domestic water heaters for an area hospital. The installation would consist of three large instantaneous steam water heaters piped in parallel.

PROBLEM

I received a phone call, late on a Friday evening, requesting our services. The water heaters serving the facility were not producing any domestic hot water for the hospital, both in patient rooms and hospital staff areas. Once I arrived, I was confronted by multiple personnel from hospital facilities as well as personnel from the mechanical contractor. The mechanical contractor had a service technician on site who had already been there for several hours with no success in getting the water heaters operational. As I reviewed the installation, I observed that the steam water heaters that were installed were over 20 plus years in age.

I questioned why one of the three heaters, Unit -3's valve was turned off and had missing piping for both

the steam side of the system, as well as the domestic water side of the system. After more investigation, it was determined that the Unit-3 water heater was abandoned several years back and that the facility was only utilizing two of the three water heaters. After further review, it was determined that only one water heater, Unit-2 had been functional, so the facility really did not have any redundancy and the single steam water heater had failed.

I find it interesting, that a facility would let things get to a point that no redundancy was available, and now everything was considered a dire emergency being that the hospital did not have any domestic hot water.

TROUBLESHOOTING

We started troubleshooting the individual heaters' issues and looking at why the steam water heater would not stay online. The service technician explained to me that Unit-1 steam water heater had a new steam-valve and thermostat installed, but when placed online, the

water heater would trip on high-temperature limit in a matter of seconds. Unit-2 water heater was operational but was not in use and could not maintain the water temperature set-point with the steam-valve 100% open.

While troubleshooting the problem, the facility personnel and mechanical contractor both were panicking and pressuring me to get these items addressed. I had to ask these guys to step-back and give me time to review the problem. I asked the lead facility plumber to escort me to the farthest point of this system where we could initiate a few tests. When we arrived at the far-end of the domestic water loop, I called the mechanical contractor and the service technician and asked that they valve off each one of the steam water heaters, individually. While watching the actual water



pressure until the end of the loop, I observed a substantial difference in pressure from the review of Unit-1 and Unit-2. Unit-2 would show around 20 PSI less pressure than Unit-1. With this in mind, we returned to each water heater to observe entering and leaving water temperatures. I saw that Unit-1 climbed in temperature quickly, while hitting the high-limit cut-out. Unit-1 had a considerable amount of difference with leaving water pressure than Unit-2. At this point, I realized the heat exchanger bundle on Unit-1 was obstructed. My thoughts at this point were that a great deal of calcium build-up was not allowing proper heat transfer. At this point we saw that the leaving steam pressure for Unit-2 was not as high as Unit-1.

SOLUTION

We elected to relocate the new steam-valve and thermostat to Unit-2 since the water pressure drop was less through the heater but could not get the heat transfer from the old steam-valve control. Once we moved the control devices over to Unit-2, we saw loop stabilization and maintaining of temperature with the single domestic steam water heater.

I reviewed the original design documents to determine that one steam water heater could maintain the design conditions for the facility. The facility staff and mechanical contractor were both pleased to see things finally get settled down after 2-hours of troubleshooting and steam-valve and thermostat relocations. The mechanical contractor received PO#'s for 3- new steam water heaters the following Monday.

SUMMARY

Even though there were several people pushing for an answer to get the issues resolved, sometimes you have to step away from all the commotion to think things out. In reality, there was a simple explanation to the problem. The heater was tripping on the high temperature limit because the GPM flow was insufficient through the steam bundle. If indeed the original steam water heaters had pressure gauges entering and leaving the water heaters, things would have been considerably easier to find.



The Progress of the **Robert Gawne Training** and Education Center

By Jeff Schools, NEBB Technical Director

When we first started this project, it was referred to as NEBB TEC. Along the way, we were able to enter into an agreement with Stromberg Metal Works, Inc. to name the facility after their beloved, long-time CEO and Past NEBB President Robert Gawne in exchange

for materials and countless hours of labor that they have put in to make this a reality.

The idea behind the training center was to not only offer the classroom aspect of the technical seminars but

> also be able to instruct the attendees in the hands-on portion of their work. By the time it is completed, it will offer our disciplines.

hands-on training possibilities for all The cleanroom space consists of an



anteroom and four separate cleanrooms. It is being served by a Trane air handling unit with hot and chilled water coils. There is a total of 12 Fan Filter Units, 2 that are ducted and 10 that are not. They will be controlled by a SAMlink Control System which provides global, individual, and per zone fan speed adjustment and monitoring. It will also include a Gateway that will



connect to our BMS through BACnet IP. Something I think our Commissioning group will enjoy tinkering with.

There is a VAV System being installed. This system is also being served by a Trane air handling unit with hot and chilled water coils. The 5 Terminal Units on this system are cooling only, electric heat. hot water coil heat, parallel fan-powered, and series fan-powered. Each of these will have runs of duct that can be tra-



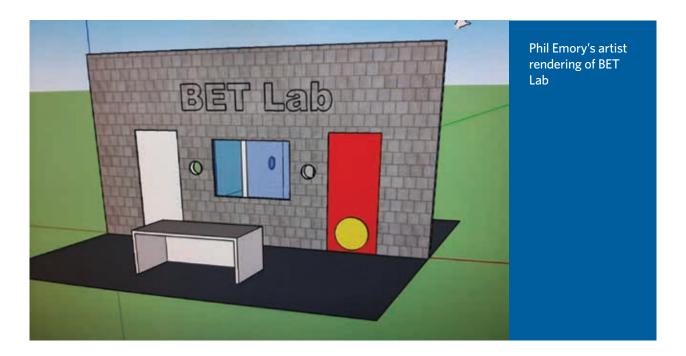


versed and various types and sizes of grills, registers, and diffusers that can be tested.

Mike Wieder from Air Filtration Management in Bethlehem, Pennsylvania was generous enough to not

only donate a couple of fume hoods but also packaged them for delivery by me and Mike Kelly, NEBB's current Treasurer. One of the hoods is going to be tied into an inline fan with a speed controller and the other will be tied into a fan and a flow control valve.

We are lucky in the fact that our space came with an area that is set up well for Building Enclosure Testing. As you will see from the picture and Phil Emory artist rendering attached to this article, there is a room with doors on each end and a window in the middle. The plan is to build a wall with a door separating the rooms in the middle of the window



and add three 14" round Young Regulator electronic balancing dampers with remote control cables to regulate the amount of leakage between each room.

This is just some of the current work going on at this time, there is also more planned in the near future, and I cannot wait to report on the progress.





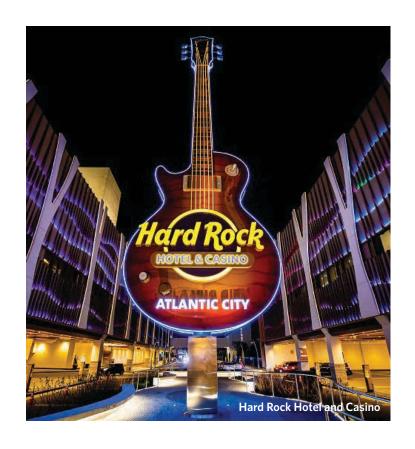
MAEBA Chapter

Trish Casey, Chapter Coordinator

MAEBA held their Semi-Annual Meeting on April 22, 2022, at the Radisson Hotel in Trevose, Pennsylvania. The seminar began with lunch with the Vendors. Thank you to all the vendors that participated. A special thank you to our speakers, John Boyle of R. D. Bitzer Co., Inc. and Mike Kelly of Air Filtration Management, Inc. for providing their presentations.

MAEBA will be holding their Annual Recertification Seminar September 18-19, 2022, at the Hard Rock Hotel and Casino in Atlantic City, New Jersey.

MAEBA will be celebrating their 50th Anniversary at this seminar. The Recertification Seminar will begin on Sunday evening, September 18th with a dinner reception at the Hard Rock Café. On Monday, September 19th, following the morning





speakers, the attendees will have the opportunity to visit the Vendors while enjoying their dessert. This is a great opportunity for attendees to meet the vendors and learn about the latest and greatest equipment and software the vendors have to offer. If you have a topic that would be interesting for the MAEBA CP'S and CT's, please contact Trish Casey, MAEBA Chapter Coordinator, to see if there are still time slots available on September 19th.

TEBB

William Bailey, Chapter Coordinator

The TEBB Chapter will hold their training on April 22, 2022 at ATS Test & Balance, 3161 Stage Post Drive, Bartlett, TN 38133. The training agenda will include TAB for Captive Air Hood Systems, Derek Hedrick, Chief Technology Officer/President, Ameritech Computer Consultants, Inc., on Cyber Security and TAB Software.

Florida EBB Chapter

Terry T. Wichlenski, Chapter Coordinator

Florida EBB will be hosting their 41st Recertification Conference and Business Meeting at The Brownwood Hotel & Spa in The Villages, FL April 28-29, 2022. We will be welcoming Jon Sheppard, NEBB President and Jon will be providing two





sessions (TAB Excel Forms & TAB Construction Project Managers) for our chapter. We also have Brent Baird with Instruments Direct and a session on Pension & Retirement Planning presented by Orlando Wealth Management just to mention a few. If you are interested in joining us please contact Terry Wichlenski, Chapter Coordinator for the Registration Form.

Our next planned NEBB Practical Exams are being confirmed so please contact Terry at 727-240-4254 or febbchapter@nebb.org

Rocky Mountain NEBB Chapter

Stuart McGregor, Chapter Coordinator

The RMNEBB chapter is administering two Certified Professional practical exams on Friday, March 25, 2022, at our new partner facility with TABB.

This is a new endeavor between RMNEBB and TABB, which we hope will be successful.

RMNEBB may be offering Certified Professional Practical Exams to out of Chapter individuals in the near future.

Capital MarVa Chapter

Barbara Huber, Chapter Coordinator

Capital MarVa's 2022 Recertification Seminar will take place on April 28th at the Crowne Plaza in Annapolis, MD. •



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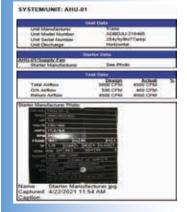
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20 22 22 NEBB Technical Seminars Schedule

June 7 - June 8 Labconco, Kansas City, MO Fume Hood Performance Testing Seminar

June 9 - June 12
NEBB TEC, Gaithersburg, MD
Testing Adjusting and Balancing Seminar

September 12 - September 14
NEBB TEC, Gaithersburg, MD
Clean Performance Testing Seminar

September 15 - September 18
IMI Training Center, Irvine, TX
Testing Adjusting and Balancing Seminar

September 19 - September 21 NEBB TEC, Gaithersburg, MD Commissioning RCx Seminar

Sign up now through your certelligence account. More information soon!

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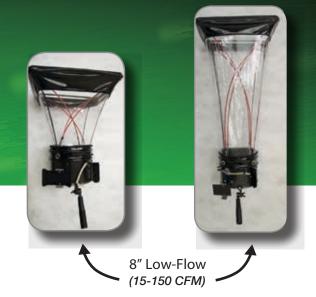
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