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Life Safety Dampers: Code-Required Testing (Part 2)
5 Signs It’s Time to Sell Your Business
NEBB Volunteers: A Team of Champions
2019 NEBB Annual Conference Program

Cover Story:
NEBB Certified Professionals Uphold Strict Standards in Regulated Industries
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The NEBB Professional

2019 – Quarter 1

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NEBB President’s Comments

By: Jim Whorton

To start, I wish all of you and your families a healthy and prosperous 2019. As the New Year begins, everyone takes time to prioritize projects and activities to ensure a more productive year while reviewing the past year and looking to the future for areas of improvement. NEBB is no different.

Currently, NEBB, through its committees and leadership, is working on new procedural standards, preparing to release the updated Tab Manual for Technicians, completing the NEBB Training Center buildout, along with many other projects, in addition to the daily activities required to maintain your high-quality certification organization.

As discussed in my first column, I want to focus on training and education. For 2019, NEBB’s technical committees have over a dozen educational seminars planned throughout the country. Visit the NEBB website to view the current seminar schedule and check back for updates. With the planned opening of the enhanced Training Center later this year, we look forward to expanding our ability to provide the most well-trained professionals in the industry.

The NEBB Certification Board (CB) continues to improve the certification processes. These efforts include: updating discipline-specific Bodies of Knowledge (BoKs) to ensure specific requirements for each level of knowledge are properly documented, ensuring exams reflect the requirements of BoK and providing feedback to candidates who do not initially pass to help them better prepare for future exams. The CB’s work maintains the quality standard of NEBB’s certifications.

The 2019 Annual Conference in San Antonio offers two full days of a wide variety of interesting educational sessions. Prior to the conference, there are two training events: the BET and TAB seminars (both two-days) and an Exam Day for all NEBB certifications.

Our speakers, exhibitors and vendors are great resources, both at the conference and in the future. In San Antonio, these exhibit partners can discuss specific items of interest and demonstrate products and solutions which may assist in solving complex issues or help to more efficiently perform daily tasks. Afterwards, they are an incredible networking group to aid and help identify the tools required to solve future issues.

The San Antonio Annual Conference offers many events to network with your peers, and for spouses and guests to enjoy the “Texas Hill Country.” The 22nd Annual NEBB Golf Tournament, hosted at the Silverhorn Golf Club of Texas, is a classic Hill Country golf course. Use the Get Acquainted Reception Thursday evening to catch up with old friends and make new ones. The historic River Walk is literally at the hotel’s back door and the Alamo is one block from the hotel’s front door! Visits to the City Market, Spanish Missions and Pearl District are other “can’t miss” activities which allow you to experience the great history and culture of this interesting location.

Another benefit of attending the Annual Conference is connecting with current NEBB volunteers to voice your concerns, offer suggestions and understand how NEBB works. Ask about the benefits and duties associated with becoming a NEBB volunteer. NEBB’s volunteer positions vary in terms of time requirements and workload; however, we have a place for anyone to make a difference and “dip their toes in” regardless of the time you can give.
As 2018 ends and we move toward 2019, I am amazed and proud of NEBB’s continued growth and transformation. Last year the organization approved 19 new firms and reached an all-time high in candidacy applications and individuals completing their certifications. This speaks to the integrity NEBB holds in the industry, government and other agencies as it relates to certification.

Recertification has moved from a challenging to a streamlined process over the last three years for both firms and individuals. A favorite saying of mine is, “Complaints are gifts. Problems are opportunities.” Moving forward, continual changes and upgrades will be made to Certelligence, ensuring a smooth recertification experience for both chapter reviewers and submitters. To those who provided ongoing feedback on the process over the last couple of years, Thank You!

Continuing to expand and build bridges in the industry, NEBB is strengthening alliances with ANSI regarding the development and eventual accreditation of the Building Systems Commissioning and Retro-Commissioning Standards. On the horizon are two additional ANSI standards – Cleanroom and Compounding Pharmacies. Upon completion, these publications will be excellent resources and give NEBB a much broader scope and reach within these disciplines.

One can never thank people too much, and I would like to take a moment to recognize and sincerely thank the wonderful professionals that continue to support NEBB daily – NEBB Leadership, Committee Volunteers, Chapter Representatives and staff. Thank YOU for your dedication and countless hours of time given to NEBB. You are the reason and inspiration for NEBB’s continued forward movement – thank you!

Advances and improvements start with a vision. In 2015, the NEBB Board of Directors’ embraced the vision “to raise the role of NEBB as a force for change.” Change is the heartbeat of growth and I am pleased to report that NEBB’s heartbeat is strong.

I look forward to seeing everyone in April!

I can never say enough about the efforts of the NEBB staff. They keep the NEBB ship on course. These dedicated individuals operate as a team and ensure the NEBB Board of Directors’ vision and directives are executed properly. Although they are highly qualified at their positions, they always pitch in to complete whatever tasks are needed for a successful outcome. If you talk with them, please thank them for their work.

And thank you to NEBB’s Certified Professionals and Technicians for their efforts to maintain NEBB as the industry leader in certification and training. In the end, the quality of service provided to the client by NEBB certified firms is what continues to make NEBB a highly regarded organization.

Happy New Year and I look forward to seeing you in San Antonio.
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In regard to commissioning or TAB requirements, it can be difficult for clients to decide what qualifies as a residential versus non-residential building, as is the case particularly for high-rise buildings and mixed-use facilities. I get emails and calls all the time from clients asking me to help decipher the requirements, and I am actively working to help define them,” Trobaugh states.

“But the worst possible outcome is if a contractor bypasses commissioning due to his interpretation of the language and then later, upon submitting for a certificate of occupancy, is asked for a commissioning report that does not exist. Backpedaling to perform Cx at that point is not only more expensive in terms of fixing any possible issues, but also less efficient,” he continues. “If commissioning is done right, it doesn’t cost a contractor any more money to bring a commissioning agent on earlier. Plus, they typically save costs in overall Cx tasks, and get the full benefit of meeting the code.”

This type of situation is not just isolated to Title 24. LEED’s requirements for commissioning electrical systems is another example of nondescript language that leaves too much to be interpreted. When LEED Version 3 was updated to LEED Version 4, the scope of commissioning expanded to include “electrical service and distribution.” Although the rating system suggests commissioning agents limit this broad scope to items related to LEED credits, it does not provide direction in concrete terms. Upon reaching out to LEED for clarification, Trobaugh was told it was, “up to the commissioning agent to determine.”

Given that there may be no foolproof way to avoid these types of broader code requirements at some point or another in one’s career, NEBB CPs hedge their best bets by contacting the authority having jurisdiction for further explanation, using past experience to help determine what should be
examined and when, and veering on the side of stringency when performing testing and documentation.

**Strict Standards Specific to Vertical Markets**

Other ways to define regulated industries include looking at specific vertical markets and the associated standards outlined by responsible compliance agencies for the facility types found in those markets. For example, facilities with specific manufacturing practices, such as life sciences and medical devices, are two good examples of highly regulated industries with well-known standards for ensuring performance compliance because both rely on extremely clean environments for optimal production.

NEBB supports owners in regulatory compliance by helping owners validate compliance, especially when facing tight timelines or production issues. Both TAB and CPT are highly relevant to facilities owners in these industries, but only CPT can validate the performance of a controlled environment. As NEBB works toward ANSI standards approval for CPT, it is safe to say NEBB CPs perform CPT and validation at the highest level. By testing items such as HEPA filter integrity, air exchange rates and particulate levels, NEBB CPs and CTs play an essential role in determining how cleanrooms perform.

**Regulations for Compounding Pharmacies**

Within the sphere of compounding pharmacies, alone, facilities are broken down further by the Food Drug and Cosmetic (FD&C) Act to determine appropriate standards and compliance.

“In any highly regulated facility that produces pharmaceutical products for either human or animal production, these facilities are regularly inspected by the Food and Drug Administration (FDA). During these inspections, facilities owners must demonstrate that the systems are operating in strict accordance with the performance standards established by the validation process for the facility and the particular products produced in that facility,” explains Don Hill, President of AccuTec Services, Inc.

Often found in hospitals, 503A facilities are compounding pharmacies that also typically supply large amounts of products to patients. Facilities must comply with USP 795 and 797, as well as the regulations of the state board of pharmacy, while environmental monitoring, such as that provided by a NEBB CP or CT, is performed every six months. Both the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) and the state Board of Pharmacy help to hold these facilities accountable.

“Every six months, healthcare facility owners are required to hire TAB professionals to prove that they’re in compliance or can still make product safely as is. Those TAB reports are then sent to the FDA auditors,” Hill mentions.

With a heavier focus on manufacturing, 503B facilities must also comply with USP 795 and 797, and the regulations of the state board of pharmacy, while validating every process per Current Good Manufacturing Practice (cGMP) regulations enforced by the FDA. Multiple batches of product must be submitted for testing prior to receiving clearance to bring that product to market, and a list of manufactured products must be reported to the FDA every six months.

Using the International Organization for Standardization (ISO) levels to assess the cleanliness of life sciences manufacturing cleanrooms from the central core to the buffer rooms to the ante rooms, CPT is necessary to keep airborne particle generation (mostly from the exposure of human skin) on equipment down and ensure preventative maintenance occurs.

“The primary compounding or manufacturing areas of 503B facilities, for example, need to be rated at ISO 5. One important function to achieve this rating is an established unidirectional flow over the product fill area, as the exposure of the product...
to the air before it reaches the sterilized vials it will be packaged in poses a risk for contamination,” states Jeff Raposa, Founder and President of Controlled Environment Management (CEM). When unidirectional flow with 100 percent HEPA filtration coverage is achieved, the CPT firm can ascertain that the facility meets required regulations.

“Today, one of the most popular, growing trends is for CPT accredited companies to conduct airflow visualization profiles using injected glycol vapor, CO2 or sterile water vapor. Because we record the results, we can provide actual videos to FDA auditors coming in to validate performance,” describes Raposa.

Those that adhere to the guidelines outlined by the FDA, experience faster system validation in order to pass regulatory audits and get products to market sooner. Meanwhile, those without the ability to prove compliance with the FDA’s standards, risk all or part of their production facilities being shut down.

**Noncompliance: FDA Form 483**

The FDA issues an FDA Form 483 to manufacturers when they are not in compliance with the current regulations. In fact, the FDA has recently become more aggressive in its intent to inspect compounding pharmacies, and in some cases, recalls of sterile products have accompanied FDA 483s.

An FDA Form 483 is issued to firm management at the end of an inspection when an investigator has observed any conditions that, in their judgment, may constitute violations of the Food Drug and Cosmetic (FD&C) Act and related Acts. FDA investigators are trained to ensure that each observation noted on the FDA Form 483 is clear, specific and significant. Observations are made when in the investigator’s judgment, conditions or practices observed would indicate that any food, drug, device or cosmetic has been adulterated or is being prepared, packed, or held under conditions whereby it may become adulterated or rendered injurious to health.

In the best-case scenarios, NEBB firms are able to document compliance issues in their reports and work with the manufacturer to solve those issues prior to an audit, preventing any 483s regarding environmental compliance. However, due to the nature of surprise audits or some owners opting to hire a NEBB firm only once it’s too late, NEBB professionals also work with the 483s clients have already been issued and offer viable solutions prior to the next audit.

As seen in Example 1, one of Hill’s clients received an FDA Form 483 stating an observation that “inadequate HEPA filter coverage and airflow over the area which sterile product was exposed.” To remedy this issue, cleanroom consulting for room classification and airflow patterns were provided.

Another client, shown in Example 2, received multiple observations in their FDA Form 483 showing “Personnel moved rapidly in the vicinity of instruments, which disrupted the airflow and increased the risk of bringing lesser quality air into the ISO 5 classified aseptic processing area,” and that, “Personnel conducted aseptic manipulations and placed equipment/supplies in an area that blocked the movement of first pass air around an open unit, either before or after it was filled with sterile product.” In this case, proper airflow pattern studies also provided a viable solution for compliance.

In another case, as seen in Example 3, a client’s FDA Form 483 noted, “Buildings used in the manufacture, processing, packing, or holding of a drug product do not have the suitable construction to facilitate cleaning, maintenance, and proper operations. Specifically, your firm has structural and equipment deficiencies in the classified areas which do not ensure
clean air flow," which required CPT consulting and certification to resolve.

**Designed for Compliance**

One of the best ways NEBB CPs and CTs can help owners avoid compliance issues is to get involved early and ensure best practices for compliance from the start. By reviewing mechanical plans beforehand, potential issues can be corrected far in advance of any inspection of the built facility.

“Unfortunately, many CPT firms are not involved with the design phase. I review mechanical plans whenever possible before the permitting process because not everyone has experience with pharmacies and the strict standards associated with such facilities. Once the facility is already built, we often need injection ports installed in order to perform leak tests on their HEPA filters, which further delays that facility from achieving certification,” explains Raposa. “We can usually determine if a facility will be able to hit its compliance goals by reviewing the design. We would like to see facilities designed not to meet criteria, but to go about 20 to 30 percent above the requirements for HEPA filtered airflow to give a cushion and ensure the constructed facilities are compliant.”

“A well designed and constructed cleanroom is critical to the quality of its Compounding Sterile Preparations (CSPs). The design needs to take things like HEPA test ports, velocity/volume tests, possible particulate contamination, hood types and locations, air pressures, humidity and temperature, amongst others, into consideration to achieve a compliant end result,” suggests Hill.

Overall, NEBB firms are needed to help owners overcome compliance issues, prove performance Standards in Highly Regulated Facilities, and help ensure they are set up to operate in an optimal environment. Not all owners may know it is best to bring NEBB CPs and CTs on early, but by attending meetings of relevant industry organizations such as International Society for Pharmacoepidemiology (ISPE) or Parenteral Drug Association (PDA), preaching one's capabilities as a TAB, CPT, or Cx expert, and remaining up to date on all industry standards, NEBB professionals have many opportunities to educate others and work to establish better practices across the industry.

**About the Author**

With over a decade of omni-channel marketing experience, Kerri Souilliard leverages her extensive background in digital strategy, copywriting and content development to serve clients' business goals. Her focus on key elements like messaging and branding, help lay the foundation for creative strategies that promote a company's story in the most effective way possible. Visit kreativstrategy.com.
NEBB Board of Directors Announces 2019 Members

At its annual organizational meeting held October 18-19, 2018 in Savannah, GA, the NEBB Board of Directors voted in the next slate of members and attended to other organizational business.

New NEBB Board Members include Mike Kelly, Air Filtration Management, Inc, Bethlehem, PA and Rodney Hinton, Palmetto Air and Water Balancing, Inc, Greenville, SC. Both Kelly and Hinton will serve two-year terms.

“Mike has served the Fume Hood Committee diligently for years and worked tirelessly with the CB and Exam Development Committee to complete the FHT CP Body of Knowledge, which led to a new FHT CP exam, “said NEBB President Jim Whorton. “Kelly exhibits the type of volunteerism that is not often seen.”

“Rodney Hinton is one of those professionals who can put his hand to anything and do it right. A multi-discipline professional, Rodney helped with the development of the BET discipline’s BoK and supported the BET and TAB Committees for many, many years,” stated Whorton. “We’re proud to have such dedicated professionals like Mike and Rodney join the NEBB Board.”

The newest member appointed to NEBB’s Executive Finance Committee as Treasurer is Jon Sheppard, Atlantic Testing, Powhatan, VA.

Every October the NEBB Board of Directors convenes to discuss and implement strategic plans, review upcoming priority projects and assess the status of NEBB, looking for ways to increase growth, gain efficiencies, assessing volunteer and committee involvement, reviewing potential new programs, and enhance the overall operational procedures of the organization. The NEBB Board of Directors also meets with its Certification Board to review and uphold best practices and protocol for all NEBB certifications.

Changing of the Guard: Jim Whorton (left) accepting the position of 2019 NEBB President from 2018 NEBB President Don Hill, and past president Jim Kelleher.

Executive Finance Committee
- Jim Whorton, NEBB Board President, NEBB CP in TAB, BSC, Sound, Vibration, CxPP
- Jeffrey Schools, NEBB President-Elect, NEBB CP in TAB, BSC
- Amber Ryman, NEBB Vice President, NEBB CP in TAB, BSC, RCx-EB, Sound, Vibration
- Jon Sheppard, NEBB Treasurer, NEBB CP in TAB, BSC, RCx-EB, Sound, Vibration, CxPP
- Don Hill, NEBB Past President, NEBB CP in TAB, BSC, CPT
NEBB Board Members

- Phil Emory, NEBB CP in BET
- Curtis Anthony, NEBB CP in TAB, BSC, RCx-EB, FHT, Sound, Vibration
- Patrick Law, NEBB CP in CPT
- Allen King, NEBB CP in TAB, BSC
- Glenn See, NEBB CP in TAB
- Luis Chinchilla, NEBB CP in TAB, BSC, CxPP, CPT
- Mike Kelly, NEBB CP in CPT, FHT
- Rodney Hinton, NEBB CP in TAB, BSC, BET

NEBB Certification Board Chairman Rick Farrington, with the approval of the Certification Board (CB), announced two new members to the CB: Rich Jarvis, At-Large Board Member, with Proficient TAB in Peachtree Corners, GA and Amber Ryman, NEBB Board Liaison, with ACCO Engineered Systems, in San Leandro, CA. Jarvis will serve a three-year term and Ryman a one-year term.

“Amber has served NEBB in various leadership capacities in the past, including a current term on NEBB’s Executive Finance Committee and NEBB board and we are pleased to have her involved with the CB. Rich has served diligently as an SME for three years, participating in special exam projects, bringing a wealth of knowledge to the group,” said Farrington, CB Chair. “The Certification Board is honored to have professionals like Rich and Amber serve within NEBB’s certification realm.”

2019 NEBB Certification Board

- Rick Farrington, CB Chair, NEBB CP in TAB BSC
- Brian Keller, Vice Chair, NEBB CP in TAB, BSC
- Ted Salkin, Compliance Chair, NEBB CP in TAB, BSC, CxPP
- Ron Landberg, Exam Development Committee Chair, NEBB CP in TAB, RCx-EB, BET
- Richard Jarvis, At-Large Board Member, NEBB CP in TAB, Sound and Vibration
- Glenn Putnum, Industry Stakeholder, NEBB CP in TAB, BSC, RCx-EB
- Andrew Boyd, Industry Stakeholder, Architect
- Amber Ryman, NEBB BOD Liaison, NEBB CP in TAB, RCx-EB, BSC, Sound and Vibration

Savannah was the site of the NEBB Board of Directors’ fall annual organizational meeting and its Certification Board meeting. While much work was accomplished with a packed agenda, Board Members were able to see some of the best Savannah had to offer. Shown below are the Savannah River Boat Dock in the Harbor and Monterey Square.

Illustrations by Andrew Boyd, Certification Board Industry Representative.
Life Safety Dampers: Code-Required Testing (Part 2)

Larry Felker \ Belimo Americas

Part 1 of this article, (featured in the 2018 Q4 issue of The NEBB Professional), covered the International Building Code (IBC) and International Fire Code (IFC) testing requirements for life safety dampers.

Chapter 7 of the IBC covers installation requirements for containment dampers. Along with fire alarm and sprinklers, Chapter 9 covers requirements for smoke control systems, including dampers. The same chapters of the IFC cover maintenance and testing requirements.

The different sections of the codes were detailed and summarized in Part 1 of this article. Table 1 provides a summary of the sections of the codes covered.

Table 1

<table>
<thead>
<tr>
<th>Chapter 7 Containment Dampers</th>
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<tbody>
<tr>
<td>Commissioning</td>
<td></td>
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<tr>
<td>End of first year</td>
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<tr>
<td>Every 4 years; every 6 years for hospitals</td>
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<th>Chapter 9 Smoke Control System Dampers</th>
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<tr>
<td>Dedicated</td>
<td>Non-dedicated</td>
</tr>
<tr>
<td>Commissioning</td>
<td>Commissioning</td>
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<tr>
<td>Semi-annually</td>
<td>Annually</td>
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<table>
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<td>Commissioning</td>
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<tr>
<th>Auxiliary Fire Extinguishing Equipment</th>
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<tbody>
<tr>
<td>Commissioning</td>
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<tr>
<td>Annually</td>
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<table>
<thead>
<tr>
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<tr>
<td>Dedicated</td>
<td>Non-dedicated</td>
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<tr>
<td>Weekly self-test</td>
<td>Per Chapter 9 above</td>
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</tbody>
</table>

The Four Types of Life Safety Dampers

The four general types of dampers are:

1) ceiling radiation dampers
2) fire dampers
3) smoke dampers
4) combination fire and smoke dampers (including corridor dampers)

Corridor dampers are combination fire and smoke dampers intended for installation where ducts penetrate ceilings of internal corridors. Note that variations of each damper type exist with added grills, angle connections, flanges, or other connections, but will not be discussed here.

During the periodic inspection and testing of these dampers, defects may be uncovered that the owner must correct. The agent doing the periodic maintenance is required to log defects and update the log once the problem has been corrected. This requirement is per the NFPA 80 and NFPA 105 standards which are referenced in the IFC. While the UL 555 family of standards is applied at the factory and during installation, they do not regulate existing appliances.

Ceiling Radiation Dampers

Figure 1 shows two ceiling radiation dampers. They are spring loaded with a fusible link that releases the spring to close the insulated blades. These dampers restrict the transfer of heat into the spaces above drop ceilings or ceiling-mounted ducted diffusers. They are not tested for fire resistance or smoke leakage but do restrict fire and smoke to some degree simply by blocking a duct or drop-in grill in a ceiling. The same is true of the other types of dampers for heat, fire, or smoke. Application and installation information can be found on most damper manufacturer websites.
No requirement exists in the IBC or IFC for periodic testing. Curtain dampers are the most common type of fire damper. They prevent the passage of flames but are not tested for heat transfer or smoke leakage. Horizontal and dynamic curtain dampers are spring loaded, while static vertical damper blades simply drop via gravity. Some larger and sturdier fire dampers are single- or multi-blade type with a fusible link and shaft spring to release the blades. See Figure 2 for examples.

Few fire dampers are actuated, but if so, they are of the same construction as the combination fire and smoke damper shown in Figure 4. Fire dampers are installed per Chapter 7 and are for containment. They must be tested in accordance to the schedule in Table 1. That is, at commissioning, end of the first year, and every four years thereafter except in hospitals, which is every 6 years.

**Smoke Dampers**

Smoke dampers resist smoke passage but are not tested for heat transfer or flame resistance. They may be made of aluminum, as shown in Figure 3. All smoke dampers are actuated, as there is no mechanical way to sense smoke and electrical methods are required. The actuator can be jackscrew or axle shaft mounted if the damper is within two feet of the barrier or partition it protects. Note there is no heat sensitive device.

If smoke dampers are part of a Chapter 7 installation, then the containment portion of the schedule applies. If installed per Chapter 9, they are tested according to the smoke control damper requirements. That is, semi-annually for dedicated systems and annually for non-dedicated systems.

**Combination Fire and Smoke Dampers**

Combination fire and smoke dampers prevent the passage of flames and limit smoke passage. They can be applied in either Chapter 7 or Chapter 9 applications. Figure 4 shows a typical combination damper. The 2" x 4" box below the damper contains a heat-sensitive bimetal. A smoke detector, or relay from the fire alarm/smoke control system, breaks power if smoke is detected.

Combination dampers must be tested according to the schedule shown in Table 1. Again, the frequency depends on whether the damper is installed per Chapter 7 or Chapter 9.

**Distinguishing Containment from Smoke Control Dampers**

Without examining adequate drawings for a system, it is impossible to be 100 percent certain of the purpose of each damper. However, the controls are most often a deciding indicator.

Figure 5 shows two common smoke system control methods for Chapter 9 dampers. The left drawing shows a smoke damper, while the right drawing shows a re-openable combination damper (smoke relay and fire fighters’ smoke control not shown). Position switches could be actuator auxiliary switches, damper blade switches, or magnetic switches. The point is that Chapter 9 dampers have the controls, while Chapter 7 dampers rarely have them.

The presence of switches alone is not definitive, as local position indication may be the purpose. Wiring from the fire fighters’ smoke control panel, or a relay connected via the
fire alarm or building management system, provides open-closed control override. One or two modules are required, depending on the manufacturer of the smoke control system. In some cases, the power wiring to the actuators is in a local relay panel providing override control to multiple dampers and the controls are not at the damper itself. In summary, the IFC requires periodic testing of life safety dampers to ensure functioning in case of a life-threatening event. A summary of the schedule is given in Table 1.

In order to determine which dampers must be tested to what schedule, it is helpful to know the different damper types. There is sometimes confusion about the standards and codes with respect to life safety dampers, but by carefully reviewing the summarized information above, you should be able to gain some clarity.

Figure 6 shows the damper connections in an installation. The presence of several controls on the damper and red conduit is a good indication that the damper is part of the smoke control system. If any red wiring is seen attaching to a damper actuator, it is suggestive of a fire fighters’ smoke control system connection.

**About the Author**
A specialist in fire and smoke dampers and actuators, Larry Felker is fire- and smoke-product manager for Belimo Americas. He is vice chair of Air Movement and Control Association (AMCA) International’s Fire and Smoke Damper Task Force, a member of the International Code Council, the National Fire Protection Association, and the Society of Fire Protection Engineers, and a life member of ASHRAE. He is co-author of the book “Dampers and Airflow Control,” published by ASHRAE Special Publications in 2010.

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5 https://ulstandards.ul.com/access-standards/, Underwriters Laboratories Inc. (UL), 333 Pfingsten Road, Northbrook, IL 60062-2096.
7 For example see http://www.greenheck.com/media/pdf/manuals/826252CRD/Packet_iom.pdf

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The purpose of a cleanroom recovery test is to determine the contamination decay rate for a cleanroom. The cleanroom is artificially challenged with generated particulate and the ongoing particle concentration is continuously monitored with a light scattering airborne particle counter. It is not recommended for unidirectional airflow cleanrooms, however, because the recovery rate is too brief to measure effectively. It is well suited for all other classes of cleanrooms, including non-unidirectional ISO Class 5 rooms up to and including ISO Class 9.

The concept behind the room recovery test is to determine how rapidly the cleanroom can purge itself in the event of a high contamination incident. Room recovery, not surprisingly, is an exponential decay phenomenon. The theoretical recovery time can be calculated based on two factors: the clean air change rate and the uniformity of contaminant mixing.

An exponential decay equation has a particular form as depicted in illustration 1.

Equation 1 describes an exponential decay equation:

\[ Y = Ae^{-kt} \]

In this example, \( Y \) = the decaying room particle concentration at any time, \( t \), during the decay
\( A \) = the initial concentration at time = 0, the beginning of the decay, \( C(0) \)
\(-k\) = the constant value component of the exponent, \((-k\times t)\)
\( e \) = the base of the natural logarithm \( \sim 2.718 \)
\( t \) = the expired time at which the instantaneous value of \( Y \) is desired

To normalize empirical data and to be able to compare recovery trials for different rooms, the recovery time \( t \) is formally defined as the time required for the initial concentration to decay precisely two log scales that is; 100:1. Regardless of the initial artificial concentration, the room recovery time is the time required for the clean air supply to remove enough particulate to reduce the concentration to one percent of the starting concentration. The recovery test has nothing to do with the normal steady-state room particle concentration ISO class, as is often misunderstood.

Recovery times, \( t_{0.01} \), are a function of the room air exchange rate and with a perfectly-mixed initial concentration should approach \( 4.6\times\tau \), where \( \tau \) is the reciprocal of the air exchange rate \( (3600/\text{ACH}) \) with recovery time measured in seconds. The reason for this is because, if the base of the natural logarithm is raised \( (2.718)^{4.6} \), you will get 100 - or two log scales.

Industry standards commonly invoke a number of parameters affecting cleanroom recovery rate. Some of the popular variables include air recirculation ratio, inlet-outlet airflow geometry, thermal conditions, equipment load, and air distribution characteristics. Presumptively, the most important factor contributing the room recovery rate is air change.

Illustration 1. Exponential Decay over Time
rate. However, in this study, inlet-outlet airflow geometry plays a very significant role.

Equation 2 gives the theoretical relationship between air change rate and recovery time as the solution to a mass balance equation. As an idealized equation, the assumption of perfect mixing is implicit.

\[
\frac{\delta C}{\delta t} = \frac{V}{Q} (F(t) - Q(t)C(t))
\]

Translated into English, Equation 2 simply means: **The volume-rate of change of concentration in the room is equal the rate of contaminants coming in the room minus the rate of contaminants leaving the room.** This mass balance equation could also describe your checking account balance, or the number of your children under your roof.

After artificially contaminating the room for a few seconds, and with the artificial particle generation rate, \( F(t) \), equal to zero after shutting off the aerosol generator, and the hepa filtered airflow, \( Q \), constant with time, \( t \), the equation solution for particle concentration at any point in time during the test, \( C(t) \), becomes Equation 3.

\[
C(t) = C_0e^{-Q/Vt}
\]

Airflow, \( Q \), divided by room volume, \( V \) can be recognized as air change rate, \( ACH \), as seen in Equation 4.

\[
ACH = \frac{Q}{V}
\]

Therefore, the time decay equation for room concentration becomes Equation 5.

\[
C(t) = C_0e^{-ACH*t}
\]

This is now in the standard exponential decay form of Equation 1, where \( C_0 \) is the initial concentration at time, \( t = 0 \), after shutting off the artificial particle generator.

If the desired \( C(t) = 0.01*C_0 \), as defined by the recovery rate, the solution for \( t_{0.01} \), after correcting for time units becomes:

\[
t_{0.01} = 4.6\tau
\]

Where the time constant, \( \tau \), is seconds/air change which can be found as \( 3,600/ACH \). This means there is a direct predictable relationship between room air change rate and room recovery rate. The recovery rate obviously decreases with increasing air change rate, so the reciprocal of air change rate, \( \tau \), is used. Longer times than \( 4.6\tau \) indicate relatively inefficient cleanroom ventilation, while recovery times less that \( 4.6\tau \) indicate better than expected performance.

**Case Study**

A cleanroom facility containing a combination of two distinct types of hepa filter diffusers had extensive room recovery testing performed. In the first type, the hepa filter screen had adjustable lamellae, which are designed to disrupt the unidirectional hepa filter face discharge velocity profile, creating a sideways-directed turbulent flow. Rooms containing this type of air diffuser were equipped with typical low-wall return systems. The second type of hepa filter diffuser analyzed in this study was a combination supply/return diffuser whereby air is supplied to the cleanroom with continuous perimeter sideways-lamellae and center air return, self-contained in the same fan filter unit. These rooms had no additional air return provisions. This second type of diffuser finds its utility, according to the manufacturer, in ISO 14644-1:2015 class 8 rooms whereby the design intent is turbulent dilution, rather than unidirectional airflow. Figure 1 shows the adjustable lamellae diffusers of the Type 1 room design. This is colloquially known as a twist diffuser. Figure 2 shows the airflow pattern from this type of diffuser.

Figure 3 shows the diffuser grille for the center-return and perimeter supply diffuser, while Figure 4 shows the design airflow pattern for this type.

In each room, the room recovery location was taken at the location in that room having the highest airborne particle count from previous ISO 14644-1:2015 classification testing. At least three recovery trials were conducted in each room and the precise 100:1 recovery time was calculated algebraically. In practice, most empirical reduction ratios will be between 105:1 and 150:1. This necessitates the need for algebraic
solutions to determine the precise 100:1 recovery time. The 95 percent confidence recovery time was calculated for each room and is used as that room’s recorded recovery time, $t_{0.01}$. The particular rooms chosen for this study had bubble-style pressurization with respect to all surrounding rooms, so that the precise air exchange rate could be calculated without additional complication from clean air infiltration.

Table 1 arranges the room recovery results in increasing order of actual/expected recovery time ratios.

<table>
<thead>
<tr>
<th>Room</th>
<th>Diffuser Type</th>
<th>AC/Hr.</th>
<th>Actual $t_{0.01}$ (Sec.)</th>
<th>Expected $t_{0.01}$ (Sec.)</th>
<th>(Actual/Expected) $t_{0.01}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Twist</td>
<td>27.5</td>
<td>569</td>
<td>619</td>
<td>0.92</td>
</tr>
<tr>
<td>B</td>
<td>Twist</td>
<td>28.1</td>
<td>630</td>
<td>609</td>
<td>1.03</td>
</tr>
<tr>
<td>C</td>
<td>Twist</td>
<td>26.0</td>
<td>686</td>
<td>649</td>
<td>1.06</td>
</tr>
<tr>
<td>D</td>
<td>Twist</td>
<td>25.3</td>
<td>797</td>
<td>662</td>
<td>1.20</td>
</tr>
<tr>
<td>E</td>
<td>Twist</td>
<td>25.9</td>
<td>811</td>
<td>650</td>
<td>1.25</td>
</tr>
<tr>
<td>F</td>
<td>Twist</td>
<td>28.8</td>
<td>816</td>
<td>596</td>
<td>1.37</td>
</tr>
<tr>
<td>G</td>
<td>Twist</td>
<td>27.2</td>
<td>941</td>
<td>624</td>
<td>1.51</td>
</tr>
<tr>
<td>H</td>
<td>Supply/Return</td>
<td>28.7</td>
<td>958</td>
<td>597</td>
<td>1.60</td>
</tr>
<tr>
<td>I</td>
<td>Supply/Return</td>
<td>27.6</td>
<td>998</td>
<td>618</td>
<td>1.61</td>
</tr>
<tr>
<td>J</td>
<td>Supply/Return</td>
<td>30.6</td>
<td>933</td>
<td>568</td>
<td>1.64</td>
</tr>
<tr>
<td>K</td>
<td>Supply/Return</td>
<td>27.9</td>
<td>1,022</td>
<td>611</td>
<td>1.67</td>
</tr>
<tr>
<td>L</td>
<td>Supply/Return</td>
<td>29.5</td>
<td>1,092</td>
<td>586</td>
<td>1.86</td>
</tr>
<tr>
<td>M</td>
<td>Supply/Return</td>
<td>28.0</td>
<td>1,171</td>
<td>610</td>
<td>1.92</td>
</tr>
</tbody>
</table>

The range of air exchange rates in the present study was fairly narrow with a minimum of 25.3 and a maximum of 30.6 air changes per hour. The actual 95 percent upper confidence limit (UCL) recovery times ranged from 569 to 1,171 seconds.

What is most apparent from these results in Table 1 is that all of the supply-return (Type 2) rooms had worse recovery ratios than all of the twist diffuser (Type 1) rooms. For instance, if we compare rooms A and M at the extremes of the data table, we see that even though they had essentially identical air exchange rates, the supply-return fan filter room required twice the time to recover as did the Type 1 room. Figure 5 shows these results in graphic format.

In conclusion, it seems that a significantly better contamination reduction yield, ceteris paribus, comes from the type of room design having twist diffusers and conventional low-wall

1 Expected time is based on a comprehensive previous empirical study of recovery testing whereby $t_{0.01} = 3.82^*\tau + 119$, rather than the ideal $4.6^*\tau$. 

---

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Figure 2. Twist Hepa Filter Air Supply Schematic

Figure 3. Center Return – Edge Supply

Figure 4. Supply-Return Fan Filter Unit
returns rather than the self-contained supply/return ceiling inlet/outlet fan filter. This study is limited to the two types of hepa air distribution devices represented and does not evaluate the most common type of design, i.e.: conventional terminal hepa filters with low wall return. A direct comparison of

that nature would isolate the beneficial effect of twist versus conventional supply diffusers. However, the twist diffuser, in combination with conventional low-wall returns, was very effective in approximating ideal mixing conditions, as shown by the clustering around the 1.0 ratio. The twist diffuser and low wall return combination optimized the contamination reduction efficiency.

About the Author
Matthew Lemieux, is vice president of training & quality at AIR SYSTEMS TECHNOLOGIES and has over 37 years of field experience as a biological safety cabinet certifier, air and water balancer and cleanroom certifier. He is a NEBB CPT CP, as well as a CETA accredited RCCP-SCF for sterile compounding facilities, and an active member of NEBB’s CPT Committee. He holds his B.S. in mechanical engineering from Northeastern University and has been an ANSI/NSF-49 accredited biological safety cabinet certifier since 1997.
There comes a time when you, as an owner, will exit your business. This could be the result of a strategic plan as retirement approaches, a son or daughter taking over, health issues, or possibly a liquidation event.

I am often asked, “When is the best time to exit?” The best exit (and most profitable) often comes in the form of selling the business.

Before you decide what’s right for you, let’s shed some light on a few variables that may drive your upcoming decisions:

1. Ready to Retire. Let’s mention the obvious first. Many owners are north of 60 to 65 years old and financially able to retire. If you’re in that category, it may be simple—there are other things you’d rather be doing.

2. Health Issues. About twice a year, I receive a call from an owner that goes something like this: We met 3 years ago at a show and swapped a few emails since. As you know, I haven’t taken any steps to sell. Two days ago, I went into the hospital with chest pains and now the doc says I can’t go back to work. How quickly can you get me out of here? I’m shutting the business down in 3 to 4 months if you don’t get it sold by then. This only happens to other people, right? With no exit planning in place, these unfortunate situations can be devastating for owners, their families, and valued employees.

3. Changing Industry. For over 10 years, I’ve served specialty contractors. Any industry veteran will tell you it’s not the same industry as it was 15 to 20 years ago. Still profitable? Yes. Frustrating? Absolutely.

With time, comes change for both markets and industries. At some point, every owner makes a conscious effort to fight the good fight. Others conclude it seems foreign, they’re tired of the grind, and ready to get out. Neither is right or wrong if it works for you.

4. Growth Outpaces Skillset. Typically, ‘doers’ start (or buy) their own companies. Plumbers start plumbing companies, electricians start electrical companies, HVAC techs…you get the picture. For many, ‘doing’ is the entry-level skillset required to own a successful small business. But, it’s been proven that the skillset to start a business is monumentally different than the skillset to manage and grow one.

Without this skillset evolution, frustration and burnout is typical. Thank goodness for industry experts and consultants helping cultivate ‘doers’ into managers and, eventually, leaders. Their guidance is often critical.

5. Opportunity Knocks. Exit plans should change and evolve as your circumstances do. A simple yet solid plan contains answers surrounding a sale, now or years down the road. When the right opportunity comes-a-knockin’, it may catch you by surprise. That doesn’t mean you can’t be prepared. As one of my clients recently said, “They must’ve thought we were the pretty girl at the dance.”

By getting a few questions answered, almost any business owner can prepare—not to mention, build confidence and peace of mind. With a little effort, many companies can be the ‘pretty girl at the dance.’
6 Tips to Avoid Burnout as a Business Owner

Many owners experience burnout at some point in their career. A key question should then be, “How do I avoid burnout?” Below are 6 essential tips to help avoid:

Delegate Effectively
Owners who struggle to delegate effectively will forever work in their business, not on it.

Get Expertise When Needed
Every owner has their core strengths. There is nothing wrong with the adage of playing to our strengths, but many take this as license to ignore their weaknesses. Admitting the need for help is the stumbling block.

Know Your Numbers
Some owners still rely on their gut. When asked even basic questions, it becomes apparent they don’t know. There’s too much at stake to ignore your numbers.

Prioritize Your Day
Owners can easily get frustrated over their work-life balance. It can be overwhelming, but it doesn’t need to be. According to Jack Welch, “There’s no such thing as work-life balance. There are work-life choices you make… and they have consequences.”

Remember What You Value
How long has it been since you looked in the mirror and took inventory of your values? What are your top 5 values? Do your actions and schedule reflect that list? If there are individuals on the list, do they know where they stand?

Schedule Down Time
If you’re like most owners, your schedule is overflowing. How effective are you while running at >100% capacity? Not very. Here’s a great trick- pencil in 30 minutes a day just for strategic down time. With a little practice it will quickly become the most valuable 30 minutes of your day to strategize, problem-solve, and gain clarity on the rest of your business.

About the Author
JT Kraai is president of Exit Strategies 360, specializing nationwide in business sales, valuations, and exit planning for specialty contractors. He can be reached 100% confidentially at 503.577.5649 or info@exitstrategies360.com.
In non-profit organizations, the success of any endeavor rests on the participation of its volunteers. Like football’s MVPs, they are the MVAs (most valuable assets) of the organization. Bottom line, a price cannot be placed on volunteer engagement.

NEBB is no different than other volunteer groups in the world. We rely on volunteers for their wealth of knowledge and experience, from entry- to mid-level and advanced. Everyone has something to offer. NEBB shines brightly when it comes to the caliber and commitment of its volunteers.

Credentialing organizations should strive to provide fair opportunities for interested volunteers to serve in a variety of capacities, and NEBB does that in spades. NEBB’s Certification Board runs entirely on the commitment of these hard-working professionals, from Board and Exam Development Committee Members to those working behind the scenes – the unsung heroes of exam development, subject matter experts (SMEs) / exam item writers.

According to Wikipedia, volunteering is generally considered an altruistic activity where an individual or group provides services for no financial or social gain “to benefit another person, group or organization.” Certainly, this is true of NEBB’s overall volunteer infrastructure. During the past three years, SME volunteers have suited up and taken charge of writing new exam questions, reviewing and Angoff scoring completed exams, creating bodies of knowledge, and so much more. These efforts not only make the NEBB brand and product better, but also more defensible, accurate, and consistent.

Skills-based volunteers leverage their specialized abilities and talents to strengthen the foundation of NEBB, helping to build and sustain its capacity to successfully achieve the organization’s missions. These volunteers, hailing from many different countries throughout the world, execute the game plan. The quality of these individuals, coupled with the exquisite attention to detail they give to the task at hand, is mind-boggling. Quite literally, they give for no personal gain, work for the pleasure of a job well done, and seek no recognition.

Over the past three years, through these grid-iron champs, the Certification Board and Exam Development Committee created and refreshed numerous NEBB exams and built bodies of knowledge for nearly all disciplines. To name a few new exams that were retooled to best practice standards: TAB CP Form 2, TAB CT Form 2 and Form 3, TAB CP Form 2 Metric, RCx-EB CP Procedural Standards, RCx-EB CP Technical Exam, FHT CP Form 2, CPT CT Form 1, CPT CP General Knowledge Form 1, CPT CP Written Practical and the BSC CxCT. Currently, on the slate of priority projects are two new BSC exams, a new BET exam and TAB CP exam.

All this effort deserves sincere appreciation and recognition to those who help move the metaphorical ball over the line and keep NEBB’s certification programs going in championship style. Many thanks to our volunteers, including:

1. Oguzhan Ardic
2. Mark Andrews
3. Paul Chasteauneuf
4. Ryan Chang
5. Rob Chopowick
6. Ed Culp
7. Scott Davies
8. Phil Emory
9. Rick Farrington
10. Brent Hahn
11. Firas Hakim
12. Rich Jarvis
13. Brian Keller
14. Mike Kelly
15. Patrick Law
16. Ron Landberg
17. Mike Locke
18. Kevin Marinkovich
19. Nick McDonald
20. Andy Nolfo
21. Mike Peak
22. Mark Privitt
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24. Mark Rusnock
25. Tiffany Russell
26. Curtis Smart
27. Terry Townsend
28. Dan Velasquez
29. Brian Weldon

Interested in becoming a NEBB volunteer?
Email support@nebb.org.
James T. Kemp, NEBB Canada YPN Chapter Liaison

James T. Kemp, TAB CT, was approved to the YPN’s Chapter Liaison Program.

Hailing from Kitchener, Ontario, James represents the NEBB Canada Chapter in all things YPN. Employed by Air Audit, he began his career for three years as a Combat Engineer in the Canadian Forces, focusing on general infantry and troop support, construction and maintenance. He obtained his HVAC Systems certificate from the Cambridge Pre-Apprenticeship Training Institute. James received his NEBB TAB CT in June 2017 and holds certifications and/or certificates in over 11 industry-related areas.

Attending many chapter conferences and NEBB national annual conference, Kemp has used the opportunities to maintain and expand his competency within his respective line of work. His experiences with NEBB events have been “an exceptionally positive experience” and broaden his knowledge of air and hydronic balancing.

“I’m thrilled for the opportunity to connect with like-minded individuals and reaching out to the local Canadian YPNers. The YPN mission is one that I can truly stand behind, said Kemp. “My experience thus far with NEBB has been fulfilling and served me well at Air Audit. I recommend the organization to potential young NEBB YPNers at every opportunity.”

Michael Funk, Southwest NEBB YPN Chapter Liaison

Michael Funk was approved as the YPN Chapter Liaison, representing NEBB’s Southwest Chapter.

Funk holds his NEBB CPT CP and is employed by Pentagon Technologies which services the critical environment industry. Beginning as a CPT CT, he focused on cleanroom and front-end module “Minienvironment” certifications for Intel and other various sized semiconductor facilities. Funk was promoted to project manager, then Certification Program Manager, and for the past 18 months, is Pentagon’s Director of Operations, overseeing the site services division.

Michael resides in Gilbert, AZ with his wife, Shonna, and their two children. Active in his local community, in his spare time Funk’s volunteer service includes coaching youth sports and is now a fund-raising volunteer for Arizona’s First Responders. He is president of his Homeowners Association Board and on the Board of Governors for the Seville Golf and Country Club.

Attending local chapter events through the years, Funk is looking forward to his new position with the Southwest Chapter’s YPN group.

“Hearing about this new opportunity and the YPN’s mission statement is exciting. One of my most enjoyable responsibilities with Pentagon has been developing and guiding technicians,” stated Funk. “The YPN Chapter Liaison role may allow me to continue my passion to mentor and increase the value of what it means to hold a NEBB certification in our industry. I stand behind the goal of growing the NEBB industry for years to come.”

Welcome James and Michael!
2019 NEBB Annual Conference
Training & Education: The Bridge to Excellence

Pre-Conference Program Guide

Hyatt Regency • San Antonio • April 4 – 6, 2019
Welcome to the 2019 NEBB Annual Conference!

With your feedback, the Conference Planning Committee along with NEBB Staff have put together another great program of technical sessions and secured industry experts to present at the 2019 Conference in San Antonio. The popular three-track session schedule with educational topics across all NEBB disciplines will remain the format for this year’s conference. Don’t forget the registration discount for firms registering three or more attendees.

Our event location, on the banks of the River Walk, overlooking the Alamo, is in the heart of San Antonio. This location provides fantastic weather, great meeting spaces, and allows easy access to historical sites, shopping and dining. A variety of spouse and guest events will allow for further exploration of the city’s rich culture and history.

I look forward to meeting you at the conference, at Silver-Horn Golf Club for the annual NEBB Golf Tournament, or at one of the multiple networking events we have planned.

Thanks,

Jim Whorton
President of NEBB
The NEBB Professional – 2019 – Quarter 1

Message from the President

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Thanks,

Jim Whorton
President of NEBB

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2019 NEBB Conference Schedule at a Glance

| Monday – April 1 | 8:00 am – 5:00 pm | NEBB Building Enclosure Testing Seminar (BET) for Certified Professionals |
|                 | 8:00 am – 5:00 pm | NEBB Testing, Balancing and Adjusting (TAB) Seminar |

| Tuesday – April 2 | 8:00 am – 5:00 pm | NEBB Building Enclosure Testing (BET) Seminar for Certified Professionals |
|                  | 8:00 am – 5:00 pm | NEBB Testing, Balancing and Adjusting (TAB) Seminar |
|                  | 12:00 pm – 5:00 pm | Annual Conference Pre-Registration Open |

| Wednesday – April 3 | 7:00 am – 5:00 pm | Annual Conference Registration Open |
|                     | 8:00 am – 5:00 pm | NEBB Exam Day |
|                     | 8:00 am – 5:00 pm | Closed Committee Meetings |
|                     | 6:30 pm – 10:00 pm | NEBB Volunteer Appreciation Dinner |

| Thursday – April 4 | 7:00 am – 5:00 pm | Annual Conference Registration Open |
|                   | 7:00 am – 3:00 pm | NEBB 22nd Annual Golf Tournament |
|                   | 8:45 am – 4:00 pm | Optional Guest Event (San Antonio and CIA Private Tour) |
|                   | 1:00 pm – 5:00 pm | Exhibit Hall Open |
|                   | 4:00 pm – 5:00 pm | NEBB Past Presidents’ Meeting |
|                   | 5:30 pm – 6:45 pm | Opening Session: Welcome and Keynote Presentation |
|                   |                 | Keynote Speaker: Mark Jeffries |
|                   | 7:00 pm – 10:00 pm | Get Acquainted Reception |

| Friday – April 5  | 7:00 am – 8:00 am | Breakfast |
|                  | 7:00 am – 5:00 pm | Annual Conference Registration Open |
|                  | 7:00 am – 5:30 pm | Exhibit Hall Open |
|                  | 8:00 am – 9:00 am | TAB Teach the Examiner Session |
|                  | 8:00 am – 3:45 pm | Technical Track Sessions |
|                  | 9:00 am – 2:00 pm | NEBB Guest Breakfast and Alamo Tour |

Technical Track Sessions

8:00 am – 9:30 am
- Track 1: BSC and TAB – Syed M. Abidi
- Track 2: CPT and IAQ – Don Hill
- Track 3: Business and Leadership Practices – Dave Molenda

9:45 am – 11:15 am
- Track 1: BSC and TAB – NEBB YPN Committee
- Track 2: CPT and IAQ – Tom Checksfield
- Track 3: Business and Leadership Practices – Dave Molenda
# 2019 NEBB Conference Schedule at a Glance (con’t)

## FRIDAY - APRIL 5 (continued)

11:15 am – 12:30 pm  Networking Luncheon  

Technical Track Sessions  
12:30 pm – 2:00 pm  
- Track 1: BSC and TAB - Scott Gordon  
- Track 2: CPT and IAQ - Vincent Paez  
- Track 3: Business and Leadership Practices - Chapter Affairs Committee  
2:15 pm – 3:45 pm  
- Track 1: BSC and TAB - Industry Professionals  
- Track 2: CPT and IAQ - Hugh Gotts  
- Track 3: Business and Leadership Practices - JT Kraai  
2:30 pm – 3:00 pm  Certelligence Do’s and Don’ts  

## SATURDAY - APRIL 6  

7:00 am – 8:00 am  Breakfast  
7:00 am – 2:00 pm  Annual Conference Registration Open  
7:00 am – 5:30 pm  Exhibit Hall Open  
8:00 am – 9:15 am  NEBB Town Hall and Business Meeting  
8:00 am – 4:00 pm  Chapter Coordinators Meeting  
9:45 am – 3:30 pm  Technical Track Sessions  

9:45 am – 11:15 am  
- Track 1: BSC and TAB - Steve Rybka  
- Track 2: CPT and IAQ - Don Long  
- Track 3: Business and Leadership Practices - TBA  

11:15 am – 12:15 pm  Networking Luncheon  
12:15 pm – 1:45 pm  
- Track 1: BSC and TAB - Gus Faris  
- Track 2: CPT and IAQ - Cheryl Hughes  
- Track 3: Business and Leadership Practices - TBA  
2:00 pm – 3:30 pm  
- Track 1: BSC and TAB - Gus Faris  
- Track 2: CPT and IAQ - Vincent Sakrada  
- Track 3: Business and Leadership Practices - Lane Kelman  
3:30 pm – 5:00 pm  Vendor Reception and Prize Giveaway  
5:00 pm – 6:30 pm  Closing Session  
  Keynote Speaker: Mark Mayfield  

## SUNDAY - APRIL 7  

8:00 am – 12:00 pm  Board of Directors Meeting – OPEN  
12:00 pm – 5:00 pm  Board of Directors Meeting – CLOSED  

*Schedule subject to change*
2019 NEBB Conference Schedule at a Glance (continued)

FRIDAY / APRIL 5 (continued)
11:15 am – 12:30 pm  Networking Luncheon
Technical Track Sessions
12:30 pm – 2:00 pm
Track 1: BSC and TAB - Scott Gordon
Track 2: CPT and IAQ - Vincent Paez
Track 3: Business and Leadership Practices - Chapter Affairs Committee

2:15 pm – 3:45 pm
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Track 3: Business and Leadership Practices - JT Kraai

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7:00 am – 5:30 pm  Exhibit Hall Open
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3:30 pm – 5:00 pm  Vendor Reception and Prize Giveaway
5:00 pm – 6:30 pm  Closing Session
Keynote Speaker: Mark Mayfield

SUNDAY / APRIL 7
8:00 am – 12:00 pm Board of Directors Meeting – OPEN
12:00 pm – 5:00 pm Board of Directors Meeting – CLOSED

*Schedule subject to change

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NEBB 22ND ANNUAL GOLF TOURNAMENT

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Join Us at SilverHorn Golf Club of Texas
Thursday - April 4, 2019

NEBB Annual Conference attendees and guests are invited to join their colleagues for the 22nd year of the Annual Golf Tournament.

The distinct Hill Country character of SilverHorn Golf Club can be credited to designer Randy Heckenkemper along with PGA Tour Professionals Willie Wood and Scott Verplank. SilverHorn Golf Club’s tree-line fairways, strategic use of sand and water, and beautifully framed contoured greens make this par 72 course a treasured Hill Country experience long remembered.

SilverHorn Golf Club is a fantastic upscale Golf Club that is a must play while in San Antonio.

Golf registration is $115.00 per player to include ground transportation to and from the course, greens fees and cart fees. Breakfast and lunch will be provided for golfer’s onsite at the golf course. An awards presentation and scoring will be held following play at SilverHorn Golf Club.

*Golf club rentals are available for $50.00, arrangements must be made in advance due to limited supply. Under the main registration process, please register your preference for left-handed or right-handed rental golf clubs. Golf registration cancellations must be sent to and approved by the NEBB Main Office by March 22, 2019.

*No golf registration refunds will be issued after March 22, 2019.
The NEBB Professional – 2019 – Quarter 1

2019 NEBB Conference Advance Program

TECHNICAL TRACK SESSIONS: FRIDAY, APRIL 5 • 8:00 AM – 9:30 AM

TRACK 1: BSC AND TAB

8:00 am – 9:30 am  Enforcing Local Law 87/09 - New York City’s Mandated Retro-Commissioning Statute
SPEAKER: Syed M. Abidi - Administrative Engineer - Sustainability Enforcement
New York City Department of Buildings

This session provides an overview of NYC’s regulatory compliance requirements specific to the technical retro-commissioning component of Local Law 87/09, in addition to other comprehensive building energy efficiency policies. It also highlights what may be coming up on the horizon as it relates to NEBB procedural reference standard: Technical Retro-Commissioning of Existing Buildings (ANSI Approved).

SPEAKER BIO: Syed Abidi is currently enforcing sustainability laws at NYC Department of Buildings as an Administrative Engineer. Mr. Abidi is a Professional Engineer, registered in the State of New York, with more than ten years of diverse experience in engineering design and energy efficiency industry both in private and public sector.

TRACK 2: CPT AND IAQ

8:00 am – 9:30 am  NEBB Opportunities in Regulated Industries
SPEAKER: Don Hill - President, AccuTec Services, Inc.

This session will address non compliance issues and how a NEBB professional has the technical knowledge, skills and training to assist facilities in the resolution of compliance matters. The session will present real world non compliance issues and specific ways NEBB professionals can assist.

SPEAKER BIO: Don is president of AccuTec Services, Inc in Kansas City, MO. He is a certified professional in TAB, CPT and BSC. His firm provides requalification services and initial qualification services for regulated facilities. Don is a past president of NEBB and served on the CPT committee for several years.

TRACK 3: BUSINESS AND LEADERSHIP PRACTICES

8:00 am – 9:30 am  When the Golden Rule Doesn’t Work
SPEAKER: Dave Molenda, CPBA, CPDFA - Founder, Positive Polarity

Did you know that 85% of our success in life is not due to our education, passion or drive, but rather how well we communicate? In this fast paced executive briefing, we will learn how to more effectively communicate with those around us. And we will uncover the times that the Golden Rule doesn’t work in communication!

SPEAKER BIO: After almost 30 years of starting, growing it to $10,000,000 in annual sales, and selling his business, Dave Molenda realized his passion was helping companies thrive by overcoming their natural tendencies to retreat and not talk about the hard stuff and spin their wheels on the wrong things. Dave is an Amazon #1 Best Selling Author for his book, Growing On Purpose. He is also DISC certified, and has spoken at past NEBB events and participated as a Keynote speaker for FEBB.
## TECHNICAL TRACK SESSIONS: FRIDAY, APRIL 5 • 9:45 AM - 11:15 AM

### TRACK 1: BSC AND TAB

**9:45 am – 11:15 am**  
**TAB Training Technology Through Virtual Reality**  
**SPEAKER:** NEBB YPN Committee  

Display of the virtual balancing tool created and discuss the accessibility of the product, to anyone with an internet connection. There will be a few of the YPN displaying their TAB skills during the session and whilst the ins and outs of the product are discussed. We would then move to an open forum style Q&A period to close out the session.

**SPEAKER BIO:** The NEBB YPN are an articulated group of five guys spanning the globe. The desire for excellence and industry leading initiatives drives these guys to find, research and share the latest opportunities in their relative disciplines to keep NEBB way above the rest. With enthusiasm, passion and energy forming some of the key ingredients to this group. They are seeing amazing things unfold around them. The recognition of the vision from Jean-Paul Leblanc from the start of this group and with the incredible input from past president Jim Kelleher this group continues to grow from strength to strength.

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**9:45 am – 11:15 am**  
**ASHRAE 110 Fume Hood Testing – New Systems, New Standard, New Opportunities**  
**SPEAKER:** Tom Checksfield - SVP, Operations, 3FLOW  

Laboratory fume hoods are still the primary means of protecting people working in labs with hazardous airborne materials. However, fume hood systems are becoming increasingly more complex. This presentation will discuss proper techniques for measuring face velocity, evaluating variable air volume flow response and diagnosing problems affecting fume hood containment performance. New methods currently under development to simplify and reduce the costs of conducting fume hood tracer gas tests will also be discussed.

**SPEAKER BIO:** Mr. Tom Checksfield is currently Senior Vice President, Operations at 3FLOW. Before joining 3FLOW Mr. Checksfield worked as the General Manager at Tek-Air Systems Inc., a critical environment controls manufacturer for 14 years. Prior to Tek-Air, Mr. Checksfield worked with Siemens Building Technologies as a Senior Account Manager, specializing in critical environmental control systems. Mr. Checksfield has over 30 years of experience in the HVAC, energy management and laboratory control fields.

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### TRACK 3: BUSINESS AND LEADERSHIP PRACTICES

**9:45 am – 11:15 am**  
**How to Provide the Best Customer Experience Ever**  
**SPEAKER:** Dave Molenda, CPBA, CPDFA - Founder, Positive Polarity  

Did you know that by the year 2020 (next year!) that your customer’s experience will be more important to them than the price and product? The question is, are you ready? In this fast paced executive briefing, we will help you prepare for this evolving idea. Hint, we spoke to your customers and that have told us what they want!

**SPEAKER BIO:** After almost 30 years of starting, growing it to $10,000,000 in annual sales, and selling his business, Dave Molenda realized his passion was helping companies thrive by overcoming their natural tendencies to retreat and not talk about the hard stuff and spin their wheels on the wrong things. Dave is an Amazon #1 Best Selling Author for his book, Growing On Purpose. He is also DISC certified, and has spoken at past NEBB events and participated as a Keynote speaker for FEBB.
## TECHNICAL TRACK SESSIONS: FRIDAY, APRIL 5 • 12:30 PM – 2:00 PM

### TRACK 1: BSC AND TAB

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<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker</th>
<th>Description</th>
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</table>
| 12:30 pm   | Energy Auditing for the NEBB CP                           | Scott Gordon - President, EBCx Services | This session presents the benefits of developing an energy audit program within your firm, and why it is a win/win scenario to both you and your customers. Building upon your firm’s existing business relationships, resources, instrumentation and workflow processes, you can leverage and transfer skills that provide a truly valuable service to both existing and prospective customers.  
**SPEAKER BIO:** Scott Gordon owns EBCx Services and has over 40 years of experience in the mechanical contracting and energy services industries. He is a voting member of NEBB’s BSC Committee and holds multiple certifications through NEBB and AEE. Scott has a passion for optimizing the indoor environment through EBCx and TAB. |

### TRACK 2: CPT AND IAQ

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<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker</th>
<th>Description</th>
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</table>
| 12:30 pm   | Two Primary Technologies Used for In-Situ Filter Leak Testing | Vincent Paez - Americas Director, Air Techniques International | There are strict guidelines as to how to document and test HEPA filters to ensure that all leaks found. This presentation will look at whether particle counters should be used as an alternative method to photometers for leak testing in-situ HEPA filters. Service providers and cleanroom specialists will benefit from this data-driven perspective.  
**SPEAKER BIO:** Vincent Paez has a BS in Chemistry and an MBA. He has many years of experience in analytical chemistry as VP of Sales at Thermo Fisher Scientific. He has recently joined ATI, the leading supplier of photometers, as Director, responsible for sales and customer service in the Americas. |

### TRACK 3: BUSINESS AND LEADERSHIP PRACTICES

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<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker</th>
<th>Description</th>
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</table>
| 12:30 pm   | PANEL DISCUSSION: Chapter Affairs and Firm Certification: Bringing Clarity to Certification Requirements | Chapter Affairs Committee (Tiffany Suite, Glenn See and Jeff Schools) | The purpose of this panel is to bring clarity based on past and current experiences resolving compliance issues with the governing documents.  
**SPEAKER BIO:** The NEBB YPN are an articulated group of five guys spanning the globe. The desire for incredible input from past president Jim Kelleher this group continues to grow from strength to strength. Around them. The recognition of the vision from Jean-Paul Leblanc from the start of this group and with the energy forming some of the key ingredients to this group. They are seeing amazing things unfold opportunities in their relative disciplines to keep NEBB way above the rest. With enthusiasm, passion and multiple certifications through NEBB and AEE. Scott has a passion for optimizing the indoor environment through EBCx and TAB. |
## TECHNICAL TRACK SESSIONS: FRIDAY, APRIL 5 • 2:15 PM – 3:45 PM

### TRACK 1: BSC AND TAB

<table>
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<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:15 pm – 3:45 pm</td>
<td><strong>PANEL DISCUSSION: Integrated Project Delivery</strong></td>
<td>Don Hill / More TBA</td>
<td>How do trends toward integrated project delivery affect the commissioning process? In the integrated project delivery process the commissioning authority has relationships with the owner, design professional and the construction manager. Our services performed through the hierarchy or in a collaborative manner?</td>
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</table>

### TRACK 2: CPT AND IAQ

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<th>Time</th>
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<tbody>
<tr>
<td>2:15 pm – 3:45 pm</td>
<td><strong>Beyond Particle Counts: Cleanroom Contamination Testing</strong></td>
<td>Hugh Gotts – Director R&amp;D, Air Liquide</td>
<td>Cleanrooms need to control particles, but if over the specification then particles require identification to determine the appropriate corrective action. Plugged filters require failure analysis to identify collected particles, films. Airborne Molecular Contamination (AMCs) can pass through filters and cause haze, delamination, doping, corrosion, wetting and electrical defects for critical processes. Outgassing of filters may cause failures due to organics.</td>
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</table>

**SPEAKER BIO:** Dr. Hugh Gotts is responsible for the development of lab-based and online analytical methods for high technology industries including chemicals, ALD precursors, gases, air, films and bulk materials. He is Chairman of SEMI International PV Analytical Task Force and PV Materials committee. Hugh is an Air Liquide International Fellow.

### TRACK 3: BUSINESS AND LEADERSHIP PRACTICES

<table>
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<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>2:15 pm – 3:45 pm</td>
<td><strong>Thinking of Selling? Exit Strategy Basics for the Road Ahead</strong></td>
<td>JT Kraai – Owner and Founder, Exit Strategies 360</td>
<td>Want answers? This session is full of them! You’ll learn where to start, what’s driving company value, ways to make your company more valuable, how to prepare your business for sale, the best time to sell, who the best buyers are, and more. If you’re within 5-6 years of selling, this session is a must!</td>
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</table>

**SPEAKER BIO:** After 20+ years JT still radiates extreme drive and passion for helping business owners prepare and sell their companies for top dollar. With countless transaction details, great care is taken to add value, for both a seamless transition and ensuring the best possible retirements for his clients.
### TECHNICAL TRACK SESSIONS: SATURDAY, APRIL 6 • 9:45 AM - 11:15 AM

<table>
<thead>
<tr>
<th>Track 1: BSC AND TAB</th>
<th>Optimizing Performance to Save Energy and Improve Control</th>
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<tbody>
<tr>
<td><strong>9:45 am – 11:15 am</strong></td>
<td>Steve Rybka – Mechanical Contractor Consultant, Belimo</td>
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<td></td>
<td>There are vast benefits involved with using pressure independent valves. Technology continues to expand the scope of these benefits. In this course you will learn how pressure independent valves can make hydronic systems more stable, easier to balance, control and less expensive to operate. Additionally you will learn about the pressure independent valve technologies that are available in the marketplace.</td>
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<td></td>
<td><strong>SPEAKER BIO:</strong> Steve Rybka is the Mechanical Contractor Consultant for Belimo in the South Central Region of the United States. He is responsible for providing strategic leadership to District Sales Managers to grow the mechanical contractor business. Steve came to Belimo with over twenty years’ experience in the HVAC controls industry.</td>
</tr>
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<table>
<thead>
<tr>
<th>Track 2: CPT AND IAQ</th>
<th>Safety – It’s a Two-Way Street</th>
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<tbody>
<tr>
<td><strong>9:45 am – 11:15 am</strong></td>
<td>Donald Long – Certified Safety Professional (CSP), Southwest Research Institute</td>
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<td>General overview of the OSHA safety responsibilities of both the NEBB contractor and the client. What safety related information to ask the client for when performing work on their site as well as what general safety requirements are required from the contractor to ensure a safe work experience for both entities.</td>
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<td><strong>SPEAKER BIO:</strong> Certified Safety Professional (CSP) employed by Southwest Research Institute (SwRI), San Antonio TX. Working for SwRI for over 19 years. Responsible for fume hood, confined space, explosives and scaffold programs for SwRI. 24 years US Army specializing in CBRN defense. Authorized OSHA Outreach Instructor for General Industry.</td>
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<table>
<thead>
<tr>
<th>Track 3: BUSINESS AND LEADERSHIP PRACTICES</th>
<th>Session TBA</th>
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<tbody>
<tr>
<td><strong>9:45 am – 11:15 am</strong></td>
<td>TBA</td>
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<tr>
<td></td>
<td>Session Description To Come</td>
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</tbody>
</table>
## TECHNICAL TRACK SESSIONS: SATURDAY, APRIL 6 • 12:15 PM - 1:45 PM

### TRACK 1: BSC AND TAB

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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>12:15 pm</td>
<td>ECM Applications and Balancing Issues for Fan Coils and New Terminal Unit Equipment and Sound and Noise in Occupied Spaces I</td>
<td>Gus Faris - Vice-President of Engineering, Nailor Industries</td>
<td>The program will cover what is happening with ASHRAE, AHRI and DOE with emphasis on energy efficiency, equipment design and building design. It will focus on how Electronically Commutated Motors used in airside equipment. Specific equipment will be discussed along with control sequences, application issues, noise and balancing.</td>
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<td><strong>SPEAKER BIO:</strong> Gus Faris, Vice-President of Engineering for Nailor Industries, has over 50 years of experience in the HVAC business, 24 with Nailor Industries, Inc. He has direct responsibility for product design and development, quality assurance and field service.</td>
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### TRACK 2: CPT AND IAQ

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<tbody>
<tr>
<td>12:15 pm</td>
<td>Addressing Indoor Air Quality and Energy Efficiency Challenges while Meeting Ventilation Code Requirements</td>
<td>Cheryl Hughes - Regional Sales Manager-Commercial, Munters-Air Treatment</td>
<td>Occupied buildings require the introduction of Outside Air (OA) for ventilation purposes to pressurize the space and dilute airborne contaminants. Managing OA however requires careful planning and execution. In most commercial buildings OA represents the largest source of moisture which if not properly addresses can create Indoor Air Quality (IAQ) concerns and associated health risks. This presentation will discuss how the more efficient buildings of today present new challenges to owners and designers that lead ASHRAE, AHRI and the US Department of Energy to adopt new standards for Dedicated Outside Air Systems (DOAS) and how they are rated for energy efficiency. Various DOAS designs and the new efficient ratings will be presented.</td>
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### TRACK 3: BUSINESS AND LEADERSHIP PRACTICES

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<th>Time</th>
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<tbody>
<tr>
<td>12:15 pm</td>
<td>Session TBA</td>
<td>TBA</td>
<td>Session Description To Come</td>
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</table>
2019 NEBB Conference Advance Program

TECHNICAL TRACK SESSIONS: SATURDAY, APRIL 6 • 2:00 PM – 3:30 PM

TRACK 1: BSC AND TAB

2:00 pm – 3:30 pm  ECM Applications and Balancing Issues for Fan Coils and New Terminal Unit Equipment and Sound and Noise in Occupied Spaces II
SPEAKER: Gus Faris - Vice-President of Engineering, Nailor Industries

The program will cover what is happening with ASHRAE, AHRI and DOE with emphasis on energy efficiency, equipment design and building design. It will focus on how Electronically Commutated Motors used in airside equipment. Specific equipment will be discussed along with control sequences, application issues, noise and balancing.

SPEAKER BIO: Gus Faris, Vice-President of Engineering for Nailor Industries, has over 50 years of experience in the HVAC business, 24 with Nailor Industries, Inc. He has direct responsibility for product design and development, quality assurance and field service.

TRACK 2: CPT AND IAQ

2:00 pm – 3:30 pm  Cleanroom Performance Testing Standard Transformation
SPEAKER: Vincent Sakraida - Senior Project Manager, BR+A Consulting Engineers

The seminar will present the existing 2009 edition of the Cleanroom Performance Testing Standard. The different testing criteria will be discussed. Presently, the Cleanroom Testing Standard is being revised by the CPT Standards Committee to incorporate new testing methods, meet new standards, and meet ANSI requirements. This seminar will provide some of the anticipated changes and the reasoning behind the changes.

SPEAKER BIO: Vincent Sakraida is a Senior Project Manager for BR+A Consulting Engineers in St. Louis. He has over 30 years of cleanroom design, build, and operation experience for pharmaceutical, aviation, electronic, healthcare, and other industries. Mr. Sakraida is a member of the NEBB CPT Standards Committee and ASHRAE TC9.11 Clean Space Committee.

TRACK 3: BUSINESS AND LEADERSHIP PRACTICES

2:00 pm – 3:30 pm  Best Practices for Reducing Liability
SPEAKER: Lane Kelman - Partner, Cohen Seglias Pallas Greenhall & Furman PC

In this session, Lane Kelman will use real-life examples to impart the necessity of identifying and negotiating key contract terms to limit risk and mitigate liability. He will share project documentation best practices in conjunction with pro-active management decisions. Ultimately, attendees will leave with a better command of how they can best protect their company with their day-to-day decisions.

SPEAKER BIO: Lane has an active and diverse construction litigation practice, representing developers, general contractors, and trades in complex construction matters throughout the U.S. and internationally. He has experience with private and public projects. His work ranges from contract negotiations to claim prevention and management, construction defects, and suspension and debarment proceedings.
# 2019 NEBB Conference Information

## Hyatt Regency San Antonio

123 Losoya Street • San Antonio, TX 78205 • (210) 222-1234

## NEBB’s Discounted Single/Double Rate: $219.00

To ensure the NEBB discounted room rate, reservations must be made March 4, 2019 by 5:00 pm CST. Group rooms may sell out, so don’t delay! Rooms are subject to availability. Reservations made after March 4, 2019 will be on a space-available-and-prevailing-rate basis.

## 2019 NEBB Conference Fees Fee as of December 1, 2018

<table>
<thead>
<tr>
<th>Conference Registration Type</th>
<th>Fee</th>
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<tbody>
<tr>
<td><strong>EARLY BIRD CONFERENCE REGISTRATION</strong></td>
<td><strong>$875</strong></td>
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<tr>
<td>• Discounted Rate only until January 31</td>
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<tr>
<td>• Includes all the benefits of Full Conference Registration</td>
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<tr>
<td><strong>FULL CONFERENCE REGISTRATION</strong></td>
<td><strong>$1000</strong></td>
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<tr>
<td>• Opening Session on April 4</td>
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<tr>
<td>• Get Acquainted Reception on April 4</td>
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<tr>
<td>• Two Full days of Technical Track Sessions (April 5 and 6)</td>
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<tr>
<td>• Breakfast, Lunch, Morning and Afternoon Breaks (April 5 and 6)</td>
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<tr>
<td>• Vendor Reception and Prize Giveaway on April 6</td>
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<tr>
<td>• Closing Session on April 6</td>
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<tr>
<td><strong>GUEST REGISTRATION</strong></td>
<td><strong>$300</strong></td>
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<tr>
<td>• Opening Session on April 4</td>
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<tr>
<td>• Get Acquainted Reception on April 4</td>
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<tr>
<td>• NEBB Guest Breakfast and Alamo Tour on April 5</td>
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<tr>
<td>• Vendor Reception and Prize Giveaway on April 6</td>
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<tr>
<td>• Closing Session on April 6</td>
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<tr>
<td><strong>GUEST REGISTRATION (MINOR 18 AND UNDER)</strong></td>
<td><strong>$150</strong></td>
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<tr>
<td>• Opening Session on April 4</td>
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<tr>
<td>• Get Acquainted Reception on April 26</td>
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<tr>
<td>• NEBB Guest Breakfast and Alamo Tour on April 5</td>
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<tr>
<td>• Vendor Reception and Prize Giveaway on April 6</td>
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<tr>
<td>• Closing Session on April 6</td>
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*More details to come*
Explore all that San Antonio has to Offer

Local Attractions
San Antonio is a captivating city full of culture, charm, history and exciting activities to discover. Hyatt Regency offers an unbeatable location that overlooks the historic Alamo and the picturesque River Walk, two of the most popular landmarks in San Antonio. Walk right out the front doors to discover many exciting attractions and things to do in San Antonio.

Nightlife and Entertainment
Take the evening by storm and explore the nightlife offerings in San Antonio. You might be surprised at what you find. From classic cocktail bars, to neighborhood pubs, to urban wineries, and too many local entertainment venues to list, their nightlife scene is varied, festive and fun.

Shopping
Shopping in San Antonio is festive, fun and forever surprising. With local gems around every corner, the beauty of shopping across a diverse city is that you’re always just one shop away from exactly what you were looking for. From locally owned, unique boutiques in Alamo Heights and Pearl, to vintage stores in Olmos Park and upscale favorites at The Shops at La Cantera, they have it all and then some.
Explore all that San Antonio has to Offer (con’t)

Bring your guest along to NEBB's Annual Conference this year!

The guest registration is a great value which includes admission to the following activities:

- NEBB Guest Breakfast and Alamo Tour
- Opening Session
- Get Acquainted Reception
- Vendor Reception and Prize Giveaway
- Closing Session

ADDITIONAL REGISTRATION OPTIONS FOR GUESTS FOR AN ADDITIONAL FEE:

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Time</th>
<th>Fee</th>
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<tbody>
<tr>
<td>San Antonio City Tour: Thursday, April 4</td>
<td>8:45 AM - 1:30 PM</td>
<td>Fee: $66.00</td>
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<tr>
<td>Stays at Mission San Jose and King William District. Along the way you'll see major attractions and learn more about the history, people, food and culture so you get a complete overview of the City! Includes a private tour guide. Lunch is not included.</td>
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<tr>
<th>Event</th>
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<th>Time</th>
<th>Fee</th>
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<tbody>
<tr>
<td>The Culinary Institute Private Tour: Thursday, April 4</td>
<td>2:00 PM - 4:00 PM</td>
<td>Fee: $125.00</td>
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<tr>
<td>Following San Antonio's City Tour. Enjoy a private tour of The Culinary Institute of America (CIA) where you'll experience a private demonstration, tasting and a campus tour. You will watch a culinary demonstration by a CIA trained chef and enjoy tastings of the items prepared. Featured dishes highlight seasonal favorites from across the globe. The tried and true recipes are provided to attendees to take home and try themselves.</td>
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2019 NEBB Conference Payment Information

**PAYMENT INFORMATION**

Online registration is payable by credit cards (American Express, MasterCard, Visa and Discover) or check. If paying by check, please make payable to the NEBB Main Office and mail the check along with a 2019 NEBB Annual Conference Paper Registration Form.

Attention: NEBB – Annual Conference Registration • 8575 Grovemont Circle, Gaithersburg, MD 20877

Note: NEBB’s taxpayer ID# is 23-7180848

**OPTIONAL ITEMS**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Date/Time</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>22nd Annual Golf Tournament</td>
<td>April 4, 7:00 am – 3:00 pm</td>
<td>$115</td>
</tr>
<tr>
<td>Golf Club Rental</td>
<td>April 4, Pick up at Golf Course</td>
<td>$50</td>
</tr>
<tr>
<td>NEBB Logo Polo Shirt (SM – XL)</td>
<td>Pick up at Conference Registration Desk</td>
<td>$35</td>
</tr>
<tr>
<td>NEBB Logo Polo Shirt (2XL – 5XL)</td>
<td>Pick up at Conference Registration Desk</td>
<td>$40</td>
</tr>
<tr>
<td>BET Seminar</td>
<td>April 1 – 2</td>
<td>$800</td>
</tr>
<tr>
<td>TAB Seminar</td>
<td>April 1 – 2</td>
<td>$800</td>
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<tr>
<td>Spouse/Guest San Antonio City Tour</td>
<td>April 4</td>
<td>$66</td>
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<tr>
<td>Spouse/Guest CIA Private Tour</td>
<td>April 4</td>
<td>$125</td>
</tr>
<tr>
<td>Optional NEBB Exam Day</td>
<td>April 3</td>
<td>Contact <a href="mailto:certification@nebb.org">certification@nebb.org</a> for details and pricing</td>
</tr>
</tbody>
</table>

**REGISTRATION DISCOUNT OPPORTUNITIES**

1) If you register and pay for 3 or more registrations, you’ll receive a 10% discount on each conference registration cost
2) If you register for both the BET or TAB Seminar AND the conference, you’ll receive a 20% discount on the conference registration cost

**REGISTRATION CHANGES**

All conference registration changes should be emailed to: events@nebb.org.
Please contact the hotel and airline directly for travel updates.

**CANCELLATION POLICY**

- Written request received by March 15, 2019: Full cancellation less a 25% admin fee
- Written request received after March 15, 2019: Nonrefundable
- No-show for any reason: Nonrefundable

**CONTINUING EDUCATION CREDITS (CECs)**

- NEBB Certified Individuals registered for the 2019 Annual Conference will receive continuing education credits (CECs) for attending technical and educational sessions.
- Electronic scanning will be done for each session in order to verify attendance and allocate the appropriate number of CECs to the CP or CT.
- The 2019 Conference Program Guidebook will have the number of CECs awarded listed by each session
- CECs are calculated by the number of actual educational hours attended per session: 60 minutes = 1 CEC; 90 minutes = 1.5 CECs.
- CECs obtained by attending sessions at the annual conference can be used for submission for NEBB recertification requirements.
- CECs are awarded only for educational or technical sessions.
2019 NEBB Conference Registration Form

Please visit our 2019 Conference website: nebb.cvent.com
• Registration form and payment must be received and confirmed by NEBB Main Office by Friday, March 15, 2019
• Each attendee complete 1 registration form.
• After March 15, 2019, please register online.

Name (DISPLAYED ON BADGE): ______________________________ Email Address: ______________________________
Company Name: ______________________________ Phone Number: ______________________________
Address: ______________________________ ADA/Dietary Restrictions: ______________________________
City/State/Zip: ______________________________

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<tr>
<th>ITEM DESCRIPTION / FEES</th>
<th>QUANTITY</th>
<th>TOTAL</th>
</tr>
</thead>
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<tr>
<td>Early Bird Full Conference Registration: $875 (Expires Jan 31)</td>
<td>One Per Sheet</td>
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<tr>
<td>Full Conference Registration: $1,000</td>
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<tr>
<td>Thursday ONLY Registration: $175</td>
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<td>Friday ONLY Registration: $450</td>
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<tr>
<td>Saturday ONLY Registration: $450</td>
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</tbody>
</table>

**OPTIONAL ITEMS**

- Guest Registration: $300
- Minor Guest Registration: $150
- NEBB Polo Shirt (S – XL): $35
  *Please indicate Shirt Size (Small, Medium, Large or X-Large)
- NEBB Polo Shirt (2XL – 5XL): $40
  *Please indicate Shirt Size (2XL, 3XL, 4XL or 5XL)
- Golf Tournament Registration: $115
- Golf Tournament Club Rentals: $50
  *Please indicate Left-handed Clubs or Right-handed Clubs
- Golf Polo Shirt Size (Included in golf fee)
  *Please indicate Shirt Size (Small, Medium, Large, X-Large or 2XL)

Payment Method: ☐ Visa ☐ MasterCard ☐ AMEX
Check: Make payable to NEBB. Conference registration is NOT confirmed until payment has been received.

Total Amount Due: ______________________________ Date: ______________________________
Name on Card: ______________________________
Credit Card Number: ______________________________ Expiration Date: ______________________________
Signature: ______________________________ Security Code: ______________________________

NEBB Cancellation Policy: A 25% Cancellation Fee will be applied if written request is received/approved by March 15, 2019. After March 15, 2019 cancellation requests are non-refundable.

NEBB Main Office, 8575 Grovemont Circle, Gaithersburg, MD 20877
CHAPTER UPDATES

FEBB Chapter
Terry Wichlenski, Chapter Coordinator

The FEBB Chapter has set its 2019 NEBB TAB Practical Exams Dates.

**SCHEDULE:** The TAB Certified Professional’s Practical Exam for 2019 is scheduled at the FEBB Testing Labs (Jacksonville, Largo & Deerfield) on May 31 or June 1 and September 13 or 14.

The non-refundable examination fee is $1,000.00 each time it is administered to your candidate. Friday’s are at our Jacksonville location, Saturdays are Largo and/or Deerfield locations.

**REGISTRATION:** To obtain reservation and deadline information on the spring and fall exam dates, contact Chapter Coordinator Terry Wichlenski at (727) 240-4254 or email febcoordinator@gmail.com. Exam fees can be paid by check made payable to “FEBB.” Candidates may indicate their preference as to date, and every attempt will be made to accommodate this request. **Space is limited - so call today to reserve your spot!**

FYI: Florida’s 2019 Recertification Conference has been set for May 2 & 3, 2019 at the brand new Margaritaville Resort in Orlando, Fl. More information coming soon.

Capital-MarVa International NEBB
Barbara Huber, Chapter Coordinator

Mother Nature struck the Capital-MarVa region two years in a row during its Recertification Seminar. In 2017, Hurricane Maria devastated Puerto Rico just a few days before the seminar, leaving the Puerto Rican Firms unable to attend. Just a few days before the 2018 scheduled Recertification Seminar in September, Hurricane Florence was projected to move thru the region. For the safety of all, we quickly re-organized and rescheduled to October 31st in Springfield, Virginia. Yes, the seminar was on Halloween. While Mother Nature may have tricked us, we were treated with the attendance of 108 members.

Speakers received great reviews: Mike Byars, IMI, presented Hydronic Balancing and Steve Wiggins, Newcomb & Boyd, shared a BSC Update. To round out the event, Allen King shared the NEBB Board of Director’s update, Jon Sheppard provided training on Recertification in Certelligence and Tyler Hall gave an update on the Young Professionals Network.

A big thank you to the vendors for donating a door prize and sharing information: Tucker Biffel with Victaulic, Bob Kramer with Building Start, Gautam Patel and Vincent Paez with ATI and Jason Verbeck & Andrew Ellefsen with TSI.

Much appreciation to everyone’s flexibility with the last minute reschedule as the change brought inconvenience, travel changes and additional expenses for many. Thank you all for creating a successful event.

The smiling faces of Capital Marva members during the rescheduled Recertification Seminar on Halloween.

Tyler Hall, Barbara Huber, Chapter Coordinator and Stanley Thomas.
MAEBA Chapter
Trish Casey, Chapter Coordinator

MAEBA Semi-Annual Meeting is scheduled for April 25, 2019 at the Radisson Hotel in Trevose, Pennsylvania. This seminar will fulfill the three of the six continuing educational credit requirements for NEBB’s Certified Technicians, but all are welcome! More information will be posted on the MAEBA website in March 2019; www.maebanet.org.

The 2019 MAEBA Recertification Seminar will be held September 22-23, 2019 at Harrah’s Resort, Atlantic City, New Jersey. Join the MAEBA Chapter for a full day of great educational topics. Arrive on Sunday for the Group Dinner in the Pool Balcony. More information will be available in late Spring 2019.

MAEBA also welcomes its new YPN Chapter Liaison, Dane Gresko, who will work in tandem with Chapter Coordinator, Trish Casey, to engage young professionals at the chapter level.

Southwest EBB
Shandre Guy, Chapter Coordinator

Southwest EBB’s Annual Recertification Seminar hosted NEBB professionals, speakers and vendors. Held Friday, October 12, 2018 at ThermAir Integrated Technologies in Mesa, AZ. Attendees heard from NEBB President Don Hill about NEBB and a special session on compounding pharmacies, in addition to learning about VAV chilled beams, Fan Wall Optimization, Valves and Lab Controls and more.

Southwest EBB Session Attendees learning about various valve types.

Harrah’s Resort in Atlantic City will host MAEBA’s annual Recertification Seminar in September 2019.

Recertification events are great for interacting with fellow colleagues, learning about new equipment and techniques and networking.

Exams in San Antonio!

NEBB will again offer approved certification Candidates the opportunity to sit for various written exams and written practical exams on Exam Day at the 2019 Annual Conference in San Antonio, TX.

Those pursuing any NEBB certifications must first meet the pre-requisite/eligibility requirements, and then submit the completed Application for Candidacy and related documents or before March 1, 2019. Application approval can take up to two weeks. Exam Day is Wednesday, April 3, 2019 from 8:00 am to 5:00 pm, with Exam Sign-in from 7:00 am to 7:45 am; exams will be proctored by NEBB Staff.

Walk-ins will not be accepted or processed onsite. Only approved Candidates may sit for an exam in San Antonio, TX.

Exams will be offered for both the Certified Professional and Certified Technician. Retests can be scheduled as well, if within the appropriate time frame. Candidates can retest after the 90-day waiting period. For more information, please feel free to email certification@nebb.org.
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NEBB 2019 Technical Seminar Schedule*

**MARCH 2019**

4-6: Cleanroom Performance Testing (CPT)  
Facilities at IND, Vancouver, WA  
Seminar Registration Deadline: February 18, 2019  
(Email training@nebb.org for seminar information.)  
Optional Exam Day: March 7 & 8, 2019  
Application for Candidacy Submission Deadline: February 4, 2019  
(Email certification@nebb.org for certification information.)

18-22: Sound & Vibration Measurement (S&V)  
NEBB TEC, Gaithersburg, MD  
Seminar Registration Deadline: February 18, 2019  
(Email training@nebb.org for seminar information.)  
Optional Exam Day: March 20 & 22, 2019  
Application for Candidacy Submission Deadline: February 18, 2019  
(Email certification@nebb.org for certification information.)

**APRIL 2019**

1-2: Building Enclosure Testing (BET)  
Hyatt Regency San Antonio, San Antonio, TX  
Seminar Registration Deadline: March 11, 2019  
(Email training@nebb.org for seminar information.)  
Optional Exam Day: April 3, 2019  
Application for Candidacy Submission Deadline: March 1, 2019  
(Email certification@nebb.org for certification information.)

1-2: Testing, Adjusting and Balancing (TAB)  
Hyatt Regency San Antonio, San Antonio, TX  
Seminar Registration Deadline: March 11, 2019  
(Email training@nebb.org for seminar information.)  
Optional Exam Day: April 3, 2019  
Application for Candidacy Submission Deadline: March 1, 2019  
(Email certification@nebb.org for certification information.)

**JUNE 2019**

7-9: Testing, Adjusting and Balancing (TAB)  
NEBB TEC, Gaithersburg, MD  
Seminar Registration Deadline: May 24, 2019  
(Email training@nebb.org for seminar information.)  
Optional Exam Day: June 10, 2019  
Application for Candidacy Submission Deadline: May 7, 2019  
(Email certification@nebb.org for certification information.)

10-11: Fume Hood Performance Testing (FHT)  
Labconco, Kansas City, MO  
Seminar Registration Deadline: May 27, 2019  
(Email training@nebb.org for seminar information.)  
Optional Exam Day: June 12-13, 2019  
Application for Candidacy Submission Deadline: May 10, 2019  
(Email certification@nebb.org for certification information.)

**AUGUST 2019**

12-15: Retro-Commissioning for Existing Buildings (RCx)  
NEBB TEC, Gaithersburg, MD  
Seminar Registration Deadline: July 29, 2019  
(Email training@nebb.org for seminar information.)  
Optional Exam Day: August 16, 2019  
Application for Candidacy Submission Deadline: July 12, 2019  
(Email certification@nebb.org for certification information.)

**SEPTEMBER 2019**

9/30-10/4: Sound & Vibration Measurement (S&V)  
Total Dynamic Balance, Deerfield Beach, FL  
Seminar Registration Deadline: August 30, 2019  
(Email training@nebb.org for seminar information.)  
Optional Exam Day: October 2 & 4, 2019  
Application for Candidacy Submission Deadline: August 30, 2019  
(Email certification@nebb.org for certification information.)

**OCTOBER 2019**

7-9: Cleanroom Performance Testing (CPT)  
NEBB TEC, Gaithersburg, MD  
Seminar Registration Deadline: September 23, 2019  
(Email training@nebb.org for seminar information.)  
Optional Exam Day: October 10, 2019  
Application for Candidacy Submission Deadline: September 7, 2019  
(Email certification@nebb.org for certification information.)

13-15: Testing, Adjusting and Balancing (TAB)  
IMI Facilities, Roswell, GA  
Seminar Registration Deadline: September 29, 2019  
(Email training@nebb.org for seminar information.)  
Optional Exam Day: October 16, 2019  
Application for Candidacy Submission Deadline: September 13, 2019  
(Email certification@nebb.org for certification information.)

**NOVEMBER 2019**

4-7: Building Systems Commissioning (BSC)  
NEBB TEC, Gaithersburg, MD  
Seminar Registration Deadline: October 21, 2019  
(Email training@nebb.org for seminar information.)  
Optional Exam Day: November 8, 2019  
Application for Candidacy Submission Deadline: October 4, 2019  
(Email certification@nebb.org for certification information.)

4-5: Fume Hood Performance Testing (FHT)  
Labconco, Kansas City, MO  
Seminar Registration Deadline: October 21, 2019  
(Email training@nebb.org for seminar information.)  
Optional Exam Day: November 6-7, 2019  
Application for Candidacy Submission Deadline: October 4, 2019  
(Email certification@nebb.org for certification information.)

* Subject to change
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