Correction Factors for Capture Hoods

By Siva Iyer, Global Product Manager, TSI Inc

Capture hoods are multipurpose electronic air-balancing instruments used for reading air volume flow at diffusers and grilles. They are ideally suited for commissioning agents, facilities managers, health and safety specialists, test engineers, and test and balance professionals. These ultra-lightweight, ergonomically designed kits save time and money while helping to create a healthy and energy-efficient environment. Air capture hoods are used in many applications including air volume measurements, thermal comfort studies, HVAC testing, and adjusting and balancing.

Capture hoods are typically calibrated on a wind tunnel with a diffuser of a specific cross-sectional area for supply and exhaust. To minimize recirculation regions (non-laminar flows on one side of the hood), hood sizes...
should match the diffuser being measured as closely as possible.

Large recirculation regions will affect volume flow readings. Therefore, different diffuser sizes cannot be directly compared. On a 610 x 610 mm diffuser using a 610 x 610 mm hood, there are no recirculation regions. However, if a 610 x 610 hood is used on a small diffuser, the recirculation regions (the volume under the area where the hood is larger than the diffuser) will create turbulence and the accuracy will be impaired.

To avoid recirculation regions and ensure accurate flow measurements, it is useful to characterize the capture hood to the diffuser utilized in the facility being evaluated or balanced. Since most customers use a common diffuser size and profile throughout a facility, this is a fairly efficient way to gain accuracy with minimal up-front effort.

**Characterizing a Capture Hood to an Outlet Using a Correction Factor**

*Note:* The numbers on the illustrations are only examples of what may happen and should NOT be used as correction factors.

<table>
<thead>
<tr>
<th>Proper airflow with no recirculation regions</th>
<th>Poor airflow with recirculation regions</th>
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<tbody>
<tr>
<td>610' 610 mm diffuser</td>
<td>250' 250 mm diffuser</td>
</tr>
<tr>
<td>True air flow = 170 m$^3$/h</td>
<td>True air flow = 100 ft$^3$/min (170 m$^3$/h)</td>
</tr>
<tr>
<td>Hood air flow = 170 m$^3$/h</td>
<td>Hood air flow = 153 m$^3$/h</td>
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In addition to getting an inaccurate measurement on a 250 x 250 mm outlet, positioning it differently may give different results.
Characterizing the hood to the outlet being measured is accomplished by performing a duct traverse of the branch leading to the outlet and comparing it to the hood reading. Divide the duct traverse reading by the hood reading to come up with a correction factor to be applied to the hood readout. This correction factor can then be used on similar outlet and duct configurations.

To determine a correction factor for the hood to match a duct traverse, use the following formula:

$$\text{CF} = \frac{\text{Dtr}}{\text{Hr}}$$

Where:

- $\text{CF}$ = Correction Factor
- $\text{Dtr}$ = Duct Traverse Reading
- $\text{Hr}$ = Hood Reading

To apply the correction factor to the hood readout, use the following formula:

$$\text{Hc} = \text{Hr} \times \text{CF}$$

Where:

- $\text{Hc}$ = Corrected Hood Reading
- $\text{Hr}$ = Hood Reading
- $\text{CF}$ = Correction Factor

When selecting the relevant capture hood for the purposes above, it is, of course, very useful to have instrumentation that can store your correction factors and also provide measurement guidance for performing duct traversals. Once you have selected the proper capture hood and calculated your correction factors, you will obtain much more accurate readings – providing your customer with reliable service and upholding your professional reputation.
Technical Safety Services, Inc. [TSS] is the recognized leader in the controlled environment compliance industry. From TSS’ forty plus years testing and certifying controlled environments and containment devices to the company’s continual efforts toward the improvement and development of both the operation of the facilities they serve and the standards upon which their services are based, TSS has built a distinguished reputation upon a solid foundation of quality standards that are the bedrock of their business.

Since its founding, TSS has maintained a deep involvement with the professional organizations and regulatory bodies that shape the industries they serve. From the TSS representatives currently sitting on the executive boards of associations such as the Institute of Environmental Sciences and Technology, to their longstanding support of the American Biological Safety Association and International Society of Pharmaceutical Engineers, TSS has placed such regulatory bodies as cornerstones of their business model. One of those key cornerstones is the National Environmental Balancing Bureau.

With regional offices located nationwide, Technical Safety Services, Inc. has the unique ability to provide facility support services to national and even international clientele. A wide range of industries rely on that support. TSS serves clients in the pharmaceutical, biotechnology and medical device sectors. Research institutions and health care organizations throughout the United States depend upon the consistent, quality testing and certification services TSS provides to keep their critical facilities and equipment operating safely. And by staying on the forefront of emerging technologies, Technical Safety Services is able to provide support to developing industries exploring revolutionary discoveries such as the novel applications of nanotechnology. And yet still, with all of this advanced technology, TSS’ services are rooted in the fundamental principles of airflow and filtration within the HVAC systems and containment devices TSS’ clients employ.

The services TSS offers are as wide ranging as the regions and industries in
which they offer them. From cleanroom and other controlled environment testing and certification to the testing of containment devices like biological safety cabinets, chemical fume hoods and unidirectional HEPA filtered airflow devices, TSS provides state of the art support. Add to that list TSS’ trademarked Airflow Visualization Studies, exclusive validation and cGMP services as well as decontamination and decommissioning and you begin to see just how well rounded TSS’ service offerings are.

To support their coast to coast clientele with such a far reaching scope of services, TSS must ensure, within their organization, strict adherence to the regulatory standards with which their clients must comply. Toward that end, Technical Safety Services has established the TSS Training Institute. Through this Institute, TSS provides extensive training and experience in the practices and test procedures established by ISO, NEBB, NSF, and IEST, as well as TSS’ own Standard Operating Procedures. As a result, all TSS technicians are highly trained professionals that specialize in providing total system service and support.

Now serving as TSS’ Engineering and Quality Assurance Manager, Martin Burke helped to form the curriculum of experiential study now required of every TSS field service technician. Mr. Burke came to Technical Safety Services, Inc. shortly after graduating from the University of California Berkeley where he received his Bachelor of Science in Biophysics. Quickly achieving his NEBB certification for both cleanroom and fume hood testing, Martin dedicated himself to learning the business from the ground up. Martin embodies TSS’ core philosophies in his own passionate support of the standards upon which TSS’ services are based. This passion is evidenced, for example, in his recent work developing a replacement for sulfur hexafluoride as a tracer gas in the ASHRAE Standard 110 fume hood test. Mr. Burke is also a member of the Institute for Environmental Standards and Technology.

A more recent graduate of the TSS Training Institute, Peter Chau, serves as an excellent example of TSS’ efforts to stay on the forefront of developments in the regulatory community. Peter Chau received his Bachelor of Science in Mechanical Engineering in 1999 and has distinguished himself as a field service technician for Technical Safety Services since 2002. Peter is a NEBB Certified Professional for fume hood testing and is one of TSS’ project leads for ASHRAE Standard 110 field work.

Given the great number of regulatory bodies that Technical Safety Services, Inc. participates in, it takes extensive effort to keep abreast of all the latest developments. TSS has consistently demonstrated their ability to meet that challenge. Through the excellent accreditation, certification and recertification programs offered by organizations like the National Environmental Balancing Bureau, TSS technicians receive a thorough body of practical knowledge and experience that adds real value and meaning to TSS certifications. TSS’ clientele can rest assured that TSS field service technicians are more than just ‘book-smart.’ The accreditations offered by NEBB and other such organizations lend elements of credibility and pres-
tige to TSS’ services, elements that set TSS apart from competitors and give clients real peace of mind.

In the end, facility operators and managers need to know that their critical environments, and the crucial work and staff they contain, are operating safely, within design parameters and in compliance with all the latest relevant regulatory standards. Technical Safety Services, Inc. has a long history of delivering that necessary confidence to clients. A long history built upon a foundation of collaboration with the organizations developing and enforcing those regulatory standards. TSS is proud of their NEBB certification and proud to support the National Environmental Balancing Bureau. And here at NEBB, we’re proud to support organizations like Technical Safety Services.

Chapter President’s Message

Leading the way! Our chapter is proud to announce the offering of ongoing Certified Technician training. We encourage all Certified Professionals to take advantage of this program for your Certified Technicians. The program will offer 6 hours annually of ongoing training opportunities in an effort to keep up with the ever changing industry we are in.

Training will be offered in various categories from remedial review of TAB procedures and calculations to hands on instruction on the latest technological advances of our industry. This program will offer a certificate of completion to those who demonstrate achievement in competency of the various training activities. Our goal is to have the most well trained field technicians in our industry. This is an achievement that will surely be well received by the mechanical engineering firms, contractors, and building owners for whom we demonstrate our abilities.

The program will alternate between online training modules and hands on training every other year. This first year we will begin with the online training module focusing on a remedial review of the basics each TAB technician should already be proficient in.

Certified Professionals, I encourage you to challenge your Certified Technicians to always yearn for more knowledge. This program is completely voluntary for Certified Technicians to participate in however I have visited with many mechanical engineering firms and building owners over the past few years and this does seem to be a recurring request. I truly feel a better educated staff is the key to building a better business by higher quality workmanship and more efficiency. Join us in leading the way!
Chapter Vice-President’s Message

At the last Chapter meeting we had some new faces join us on the Northern California/Hawaii Board. Please take a moment to thank Art DeLeon (New Technical Committee Chair) and Amber Ryman (New Marketing Committee Chair) for their commitment to our Chapter.

Art comes to us from Final Air Balance of the Sacramento Area. Art’s commitment to our Board with the distance to travel is well appreciated. Amber Ryman, ACCO Engineered Systems, has been a new face of a few years to our committees and represents the commitment we ask of newer CP’s in our interview process. Take time to talk with her about her experiences as a volunteer on committee activities. The Board appreciates the new faces.

While at it, thank outgoing TCC and Marketing Chair, Jason Huffman and Bill Jeffrey. Jason has worked with the Board from his Hawaii office but has tried to schedule his mainland trips around our key meetings. Note that the Board members do not get reimbursed for Chapter meetings, so I am sure Jason (and Art) would appreciate your acknowledgement for their time. Bill may stay away this time....lol. Which time is this for Bill on our Board? Second time since I have been involved. Thank you Bill.

Treasurer update – You had an opportunity at the Annual Northern California/Hawaii Chapter meeting to review our annual budget. We have had a good amount of technician testing fees but have more to address this year. Our budget for new CP testing facility equipment is growing but has not achieved the point of purchase yet. We are on track with our goal though. Our new TCC will probably address more to you regarding possible ways you could save us money by donations in the next year.
It is time to start planning for the New Year of Marketing. So far we are going to attend the BOMA San Jose and ASHRAE Golden Gate Chapter Vendors Night this year. This is a great opportunity to come and be involved in promoting our local Northern California/Hawaii NEBB Chapter and enable you to pass along your individual company capabilities in Air & Water Balancing, Commissioning, Cleanroom Certification and Fume Hood Certification.

There are a lot of individuals that we have met in attending these functions that are very interested in what we have to offer. It is also a great time to pass along the word of what we are all about and meet potential customers in our industry.

We also plan to have our TAB Presentation for the ASHRAE San Jose Chapter Meeting later this fall. One of our NEBB NorCal/Hawaii Members will be presenting along with having a Vendor’s Table prior to the meeting. If you are interested in attending the meeting or manning the vendors table, please contact Audrey or myself.

Your Marketing Committee:

Amber Ryman, Chair, ACCO
Bill Jeffrey, DPR Construction
Jason Huffman, Pacific Test & Balance, Inc.
Sargon Ishaya, Pragmatic Professional Engineers
COMMITTEES:

TECHNICAL:
Art DeLeon, Final Air Balance, Chair
Jason Huffman, Pacific Test & Balance, Inc. - Hawaii
Amber Ryman, ACCO
Carey Tomasa, Air Balance Hawaii
Steve Smith, Pacific Test & Balance, Inc. - Napa
Ryan Chang, TAB Engineers, LLC
Randy Silva, Pacific Coast Trane
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Bill Jeffrey, DPR Construction

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Martin Burke, TSS, Inc.
Steve Smith, Pacific Test & Balance, Inc. - Napa

MARKETING:
Amber Ryman, ACCO, Chair
Bill Jeffrey, DPR Construction
Sargon Ishaya, Pragmatic Professional Engineers
Jason Huffman, Pacific Test & Balance, Inc. - Hawaii

Upcoming Events

NEBB Certified Professional Written/Practical Exam

March 9, 2013, 8:00 a.m.—4:00 p.m., San Leandro, CA
Contact the Chapter to sign up, akearns@nocalhawaiinebb.org

NEBB National Annual Convention

May 2-4, 2013, Montreal, Canada
NEBB National Annual Meeting
Contact NEBB National for more details at www.nebb.org

NEBB Technician Exam

On Demand Basis
Contact the Chapter to sign up, akearns@nocalhawaiinebb.org
For More Training Information visit www.nebb.org.

Northern California/Hawaii NEBB

39899 Balentine Drive
Suite 200
Newark, CA 94560
Phone: 510-386-1270
Fax: 510-438-6853
E-mail: akearns@nocalhawaiinebb.org

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