ASHRAE Philadelphia Chapter



Quaker City Climate

October 2025
Volume 61, Issue 2

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MEETING COSTS

Fees are based on online reservations and prepayment.

$50 Member
$70 Guest
$0 Life Member

VIRTUAL MEETING

Thursday, October 2
"Airflow Management For Data Centers"

No Charge for Members
See page 8 for info!

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October Panel Discussion

Monday, October 27, 2025
5:30 PM - 7:30 PM

"2021 International Mechanical Code Updates"

5:30 PM - 6:00 PM: Networking
6:00 PM - 7:00 PM: Panel Discussion
7:00 PM - 7:30 PM: Closing Remarks and Q&A

We are excited to invite you to a special event hosted by Philly ASHRAE, focusing on the upcoming transition from the 2018 International Mechanical Code (IMC) to the 2021 International Mechanical Code, soon taking effect in Philadelphia. This panel discussion will feature industry experts highlighting key changes, including the incorporation of A2L refrigerants, new energy efficiency provisions, the near elimination of natural ventilation as a viable option for multifamily residential buildings—along with many other important updates.

Join us as industry leading professionals break down what these changes mean for design, construction, and compliance, and share their perspectives on both the challenges and opportunities ahead.

Enjoy a cash bar with a variety of beverages and delicious hors d'oeuvres while connecting with fellow professionals in the HVAC community.

This event is a great opportunity to stay ahead of regulatory changes, strengthen your network, and gain valuable, actionable insights. Whether you're a designer, contractor, owner, Architect, or simply interested in understanding the impact of the 2021 IMC updates, this discussion will provide the knowledge you need.

Location

Live! Casino & Hotel Philadelphia
900 Packer Avenue
Philadelphia, PA 19148
Meeting will take place in the Liberty/Broad Room on the 2nd Floor

Click here for directions.

Click here to register.

See page 4 for more information.

Space is limited - reserve your spot today!

2025-2026

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President's Message

Dear Philadelphia ASHRAE Chapter Members,

Fall is here, and our Chapter year is officially underway.

Our weekly Basic HVAC System Design Course begins Tuesday, October 14, meeting on Tuesdays and Thursdays through mid-March. Special thanks go to our Basic School Coordinator, Jim Lill, and to all of the instructors who volunteer their time to make this program a success.

Thank you to everyone who joined us on September 18 for Dru Crawley, Ph.D., who presented on *Impacts of Climate Change and Urbanization on Future Building Performance*. It was a strong turnout and an insightful discussion.

We're also excited to welcome back Kishor Khankari, Ph.D., who will deliver a GBCI/AIA-approved virtual presentation on *Airflow Management for Data Centers* on Thursday, October 2 at 12:00 PM. A meeting link will be emailed the morning of October 2 to all registered attendees.

Looking ahead, on Monday, October 27, we will host a panel discussion at Live! Casino Hotel focused on Philadelphia's adoption of the 2021 International Mechanical Code. Doors open at 5:30 PM for networking and hors d'oeuvres, with the panel discussion beginning at 6:00 PM. Space is limited, so be sure to reserve your spot today.

We also have a full calendar of upcoming events. In November, we'll be participating in the SMCA Industry Night at Penn's Landing; in December, we'll gather at the Union League; and in January, we're planning a refrigeration tour and social. Stay tuned for more details on each of these programs.

As always, thank you to our volunteers, presenters, and sponsors for helping us deliver quality programs. If you'd like to get involved, have a program idea, or are interested in becoming a sponsor, I'd love to hear from you.

Sincerely,

Tyler A. Holland
Philadelphia Chapter President
c021@ashrae.net
(303) 552-1226



Click here to register and join us at Caesar's Palace!

SINCE 1919 SMCA

INDUSTRY NIGHT

FRIDAY, NOVEMBER 7, 2025
HILTON PHILADELPHIA @ PENN'S LANDING
5:00–8:30PM EST

COCKTAIL RECEPTION FOLLOWED BY DINNER, TECHNOLOGY SHOWCASES, AND BRIEF SPOTLIGHT TALKS



Join Us

BUILDING THE FUTURE:
A NIGHT OF INNOVATION, CONNECTION, AND CRAFT



Industry Night is SMCA's refreshed take on cross-industry collaboration and celebration. Formerly known as Engineer's Night, this year's event brings together contractors, engineers, vendors, and industry leaders for an evening of networking and innovation.

REGISTER: SMCA.ORG/INDUSTRYNIGHT
BY OCTOBER 22, 2025

FREE attendance for Members of SMCA, IF Contributors, Suppliers, ASHRAE, AIA, MCA of Eastern PA, GBCA, and NECA Free self-parking

Panel Discussion

Monday, October 27, 2025
5:30 PM to 7:30 PM

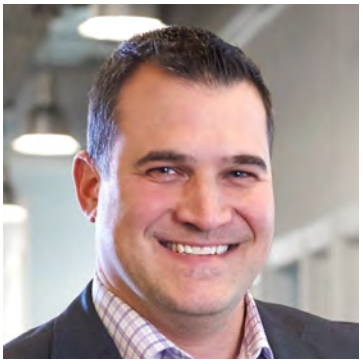
"2021 International Mechanical Code Updates"

Click here to register.

Meet our Panelists:

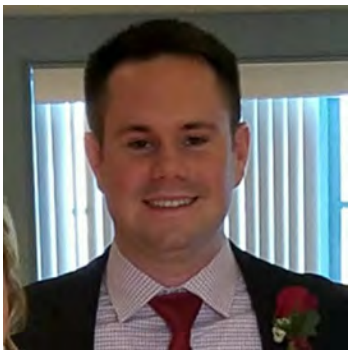


John Rihl
DWD Mechanical Contractor Inc.
John Rihl has more than 30 years of experience in the construction industry. Working alongside his father for the family firm in the late 1980's, John developed a passion for the mechanical business and operations. John has served in various roles during his career, including Owner/ Operator of Costa and Rihl and City Mechanical till 2012 and head of Service and Business Development at Falasca Mechanical from 2013 to 2019. In 2020, John joined the team at DWD as Vice President of Operations where he coordinates and oversees operation activities, pre-con, commercial construction projects, and ensures development and implementation of efficient operations and cost-effective systems to meet current and future needs of the organization.



Jason Siensa, PE
Bala Consulting Engineers, Inc.

As Mechanical Department Manager for Bala's Philadelphia office, Jason oversees the daily operations of the mechanical group, supporting projects across all Bala offices and major market sectors including mission critical, real estate, corporate interiors, higher education and building infrastructure. With a degree in Mechanical Engineering from Drexel University and over 20 years of industry experience, Jason delivers innovative, energy-efficient and reliable solutions to complex engineering challenges. He serves as a key technical resource and is committed to training and mentoring Bala's emerging engineers. Jason also oversees energy modeling and computational fluid analysis (CFD) efforts across all offices.



Thomas Gormley, PE
Burns Engineering, Inc.

Tom Gormley, P.E., LEED Green Associate has built his career in the engineering industry through diverse roles in mechanical and plumbing design. He began his professional journey through Drexel University's co-op program, gaining experience with Flowserve Corporation, Roy Larry Schlein Associates, and Ballinger, where he focused on HVAC and plumbing system design for hospitals, laboratories, and educational facilities.
Following graduation, Tom served as a Project Engineer with O&S Associates before returning to Ballinger as a Plumbing Engineer, where he spent four years designing and coordinating complex building systems. In 2022, he joined Burns Engineering as a Mechanical Engineer, where he continues to apply his expertise to a wide range of building projects across the Philadelphia region.
Licensed as a Professional Engineer and a LEED Green Associate, Tom brings hands-on design experience and a strong understanding of sustainability and code requirements, making him well-positioned to speak on the impacts of the 2021 International Mechanical Code updates.

Continued on next page . . .

October Panel Discussion *(continued . . .)*

Meet Our Moderator:



Andrew Mondell, PE
AMZ Energy Systems
Andrew Mondell is a Co-Founder and Managing Partner at AMZ Energy Systems, where he specializes in developing and delivering high-performance, sustainable HVAC solutions. With a career spanning two decades, Andrew has held key leadership roles in the energy and HVAC industries, where he was instrumental in driving large-scale decarbonization and electrification initiatives.

Andrew holds a degree in Mechanical Engineering from Penn State University and maintains several industry certifications and licenses in engineering, sustainable buildings, and energy management. His technical expertise and strategic mindset have made him a trusted partner to engineers, owners, and contractors in complex projects ranging from institutional campuses to commercial high-rises, with a strong focus on sustainability.

At AMZ Energy Systems, Andrew continues to lead with a vision for a more efficient, resilient, and environmentally responsible built environment.

When: Saturday January 24, 2026

Where: Archbishop Carroll High School
211 Matson Ford Road, Radnor, PA 19087

Future City Competition Theme: Farm to Table

DISCOVER PRESENTS
FUTURE CITY COMPETITION

The Students' Challenge:
Design a city that eliminates food waste from farm to table and keeps your citizens healthy and safe.

Visit https://www.futurecityphilly.org for more information and to volunteer.

Become a 2025-2026 Corporate Sponsor of the Philadelphia Chapter

Your firm's participation in this program would enable us to make a donation to ASHRAE's Research Promotion which includes over $1.9 million in local research funding.

Some of the benefits your company will enjoy as a Corporate Sponsor includes a listing on the Chapter's website with a link to your own website, five free log-ins to the Digital Directory, a $100 discount on an advertisement in the Digital Directory, and tickets to attend our dinner meetings which include quality educational programs.

We offer a few different levels of corporate sponsorship. Each level will receive the same types of benefits, with some differences in quantities and discounting.

Please contact Tyler Holland at c021@ashrae.net if you are interested. **Thank you for your support!**

Government Affairs Committee News

Questions or comments? Contact:
Andrew Mondell, Government Affairs Committee Chair, Andrew.Mondell@AMZenergysystems.com
or
Katherine Mahon, Government Affairs Committee Member, kem@ba-inc.com.

ASHRAE To Host Congressional Briefing: Indoor Air Quality for a Healthier America

ASHRAE is partnering with nine other leading organizations in the building sciences and human health fields to host a congressional briefing on the importance of indoor air quality (IAQ) to the health of individuals, communities, and the economy. In addition to remarks from Reps. Paul Tonko (D-NY), Don Beyer (D-VA), and Brian Fitzpatrick (R-PA) (invited), the briefing will feature panel discussions of IAQ fundamentals and how policy can support further innovations. Among the speakers are ASHRAE President Bill McQuade and Presidential Member Dr. Bill Bahnfleth. The briefing will take place in the Rayburn House Office Building's Gold Room from 9:30 a.m. to 12:30 p.m. on Friday, October 17. Attendees are encouraged to RSVP here.

ASHRAE Signs Global IEQ Pledge

ASHRAE joined with over 150 organizations from around the world in signing onto the Global Pledge for Healthy Indoor Air, which was launched at the United Nations headquarters on September 23. The pledge recognizes the importance of clean indoor air in protecting human health and improving well-being. With poor indoor air quality linked to multiple respiratory diseases including asthma and lung cancer, heart disease, infectious disease transmission, and cognitive impairment, good indoor air quality is important not only for improving health outcomes but also for boosting economic growth. You can learn more about the pledge here.

NIST Works to Develop New Standard Test Method for Air Cleaners

With air cleaners becoming more popular since the COVID-19 pandemic, concerns have been raised about their safety, in particular whether these devices release harmful pollutants into the air. The National Institute of Standards and Technology (NIST) led the development of a measurement solution to determine the amount of harmful byproducts from air cleaning devices. The test can detect the presence of ozone, which is dangerous in high concentrations, as well as formaldehyde and ultrafine particles. NIST developed the standard to serve as a means for comparing the chemical byproducts of air cleaners from different companies. You can learn more here.

San Francisco Passes New All-Electric Requirements for Building Renovations

On September 2, the San Francisco Board of Supervisors voted to approve a new city ordinance requiring most buildings undergoing major renovations to convert to all-electric buildings. The city already requires new construction to be all-electric and prohibits new natural gas hookups and appliances, but now these restrictions will also apply to most existing buildings that are being renovated (not including commercial food establishments and other limited exceptions). Effective July 2026, this ordinance moves the city closer to achieving its goal of net-zero greenhouse gas emissions by 2040. The ordinance was passed quickly due to a new state law, Assembly Bill 130, that, beginning on October 1, will restrict cities and counties from adopting new reach codes or all-electric codes for the next 6 years.

Residential HVAC Design Fundamentals
Training Series – 3 Days – Register for one or all three!
Manual J® in a Day | Manual S® in a Day | Manual D® in a Day
Click here to register: https://www.acca.org/education/combined-manuals

September 2025 Meeting Photos

"Impacts of Climate Change and Urbanization on Future Building Performance" Presented by Drury B. Crawley, Ph.D.







Virtual Meeting

"Airflow Management Best Practices for Data Centers"

Presented by

Kishor Khankari, Ph.D.

ASHRAE Distinguished Lecturer

Thursday, October 2, 2025

12:00 PM - 1:15 PM

No Charge for Members
$10 for Guests

Register Here

Synopsis:

Airflow management within data centers is crucial for proper cooling and energy efficiency of data centers. Proper selection as well as proper placement of various data center equipment such as CRACs, perforated tiles, and racks play an important role in airflow distribution and cooling performance of data centers. This presentation will focus on basics of data center cooling and principles of air movement in data centers with a wide variety of examples involving raised floor and flat floor data rooms, air leakages through server cabinets and containment systems, and role of rack thermal mass during power shutdown. This presentation will also discuss plume dispersion in the equipment yard around the data centers and optimum placement of air cooled chillers.

GBCI Approved | 1 CE Hour | 0920014296
AIA Approved|1LU| KHANKARI04

Speaker Bio:



Dr. Kishor Khankari, Ph.D. is President at AnSight LLC in Ann Arbor, MI. He provides engineering solutions and insights through Physics based simulations and CFD analysis. Kishor has several years of experience in providing optimized HVAC solutions to a wide variety of applications involving external wind engineering, plume dispersion, smoke exhaust, displacement ventilation, natural ventilation, radiant heating and cooling, and indoor air quality and thermal comfort optimization for office spaces, patient rooms, operating rooms, cleanrooms, justice facilities, data centers, and warehouses. Dr. Khankari has developed a patented technology of a wind band design of exhaust fan assembly systems. He has developed several easy-to-use analytical software tools which are regularly used by design engineers in a variety companies including those in HVAC industry, critical facilities, and automotive industries.

A noted expert in his field, he has a Ph.D. from the University of Minnesota and has been regularly published in several technical journals and trade magazines. Dr. Khankari has delivered more than 150 DL presentations worldwide on topics related to design and optimization of HVAC systems and made several presentation at various technical conferences and professional meetings.

Dr. Kishor Khankari is a Fellow member of ASHRAE. He served on ASHRAE Board as a Director-at Large. He is a recipient of Louise & Bill Holladay Distinguished Fellow Award, ASHRAE Exceptional and Distinguished Service Awards. He is the past President of Detroit ASHRAE Chapter, past Chair of ASHRAE Technical Committee TC9.11 Clean Spaces, and past Chair of Research Administration Committee (RAC). He is a voting member of Technical Committee TC9.10 Laboratory Systems and TC5.3 Air Distribution. He is a voting member of Standards committees SPC241: Control of Infectious Aerosols and SPC129: Air Change Effectiveness. He is also leading a Multi Task Group (MTG) on Air Change Rates.

Link will be sent separately prior to meeting.

The Philadelphia Chapter
of the
American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.

994 Old Eagle School Road
Suite 1019
Wayne, PA 19087-1866
P 610-971-2169

Visit
our web site at:

www.ashraephilly.org

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on LinkedIn

Republication of material contained herein is expressly forbidden without official Chapter authorization. The Chapter does not speak or act for the Society. Any member with material to submit for inclusion in the *Climate* can send the information to:

Hope Silverman
P 610-971-2169
hope@mmco1.com

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

New Philadelphia Chapter Members

Huseyin Cevik
Lora Boles
Carlos Hernandez Alicea
Richard Colasanti
Stephen Ziga
Leah Marucci

Our Chapter Digital Directory is available!

The link to the Directory of Manufacturers' Representatives in the Philadelphia Area is on our home page on the website, or you may click here to advertise or purchase access to the directory!

What are the benefits of paying Philadelphia Chapter *dues** ?

Discounts:

- $200 Discount for Basic HVAC Design Class
- Discounts on Monthly Chapter Meetings
- Free access to the Digital Directory
- And much more!

* Note that Philadelphia Chapter Membership Dues are $50/year.

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

Membership Advancement

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

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

INNOVATIVE AIR TECHNOLOGIES

2024

Battling the Environment

in Hospital Operating Rooms

By: David Schurk, National Sales Manager, Innovative Air Technologies





Many rooms in hospitals require special design considerations due to intensified infection concerns, high air change rates, special equipment, unique procedures, high internal loads, and the presence of immunocompromised patients. But in no other healthcare space does the design of the HVAC system take on more importance than in an operating room (O.R.), where its purpose is to minimize infection, contribute to an environment of patient care, and maintain staff comfort.

Hospital operating rooms are notoriously plagued with environmental control problems revolving around the inability to maintain temperature and relative humidity conditions that comply with various healthcare codes and standards while satisfying the comfort demands of surgeons and staff. This paper will provide an understanding of the underlying causes for some of the most predominant of these issues, while giving guidance on how to best cope with them. Unfortunately, many hospital facility professionals have resigned themselves to the idea that these problems cannot be resolved, which is often far from the truth.



Complaint.

Why do surgeons want the operating room cooled to such low temperatures, many times demanding 60°F (15.6°C) or colder?

CAUSE:

Many surgeons, particularly those performing orthopedic (or other highly invasive procedures), are heavily gowned in multiple layers of outer garment, while wearing face and head protection encapsulating their entire body. This protects both staff and the patient from the transfer of bodily fluids and potential bloodborne or airborne contamination. These surgeons are using an array of surgical instruments including hammers, chisels, and saws, while working diligently under intense lighting in what is a highly physical and mentally taxing environment.

Surgeons quicky begin to perspire (sweat) under these circumstances, becoming physically hot and wet, which leads to immediate distraction and discomfort. Their first inkling is a feeling they're too hot, so they demand relief through the lowering of the room's temperature setpoint in hopes of establishing a more comfortable environment.

When humans feel too warm, they seek cooler surroundings. Any relief we may experience indoors comes, in large part, from achieving the proper combination of temperature and relative humidity. Relative humidity plays a major role in our body's ability to cool (and remain cool) as it impacts the evaporation of perspiration from our skin. Lower relative humidity assists in the evaporation of moisture and is the underlying principle behind evaporative cooling. We are constantly perspiring, and the evaporation of this moisture absorbs approximately 1,060 BTU/hr of internal body heat for every one pound of perspiration removed. To effectively achieve this, increasing our skin's exposed surface area and/or lowering relative humidity may be necessary.

Surgeons who are heavily gowned have very little skin exposed to the ambient air, so unless the relative humidity (and associated air moisture content) in the environment they occupy is low enough to help assist in evaporating (wicking) this moisture through multiple layers of clothing and into the surrounding air, they may receive little if any relief in this regard. Surgeons in these situations have compared what they are experiencing to that of being wrapped in a sheet of plastic. They may be sweating profusely, experiencing extreme discomfort, and losing focus, all of which may seriously impact their performance and the patient's outcome.



CURE:

The O.R. must be controlled to that combination of temperature and relative humidity which can achieve thermal comfort while also accounting for the evaporative cooling effect mentioned above. In orthopedic surgical suites the combination of conditions that best satisfy surgical staff in these situations has been found to be 60°F (15.6°C) at 40% relative humidity.

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Complaint.

When I lower the operating room space temperature (at the request of the surgeon) the relative humidity goes up!

CAUSE:

Most hospital central utility plants produce and provide a chilled water temperature (CWT) of 42°F (5.6°C) which is pumped to HVAC system cooling coil's tasked with cooling and dehumidifying supply air for distribution throughout the facility. While this CWT may be cold enough to produce satisfactory (sensible) temperatures, it is usually not cold enough to properly dehumidify the air in order achieve the lower relative humidity conditions required in the O.R. space.

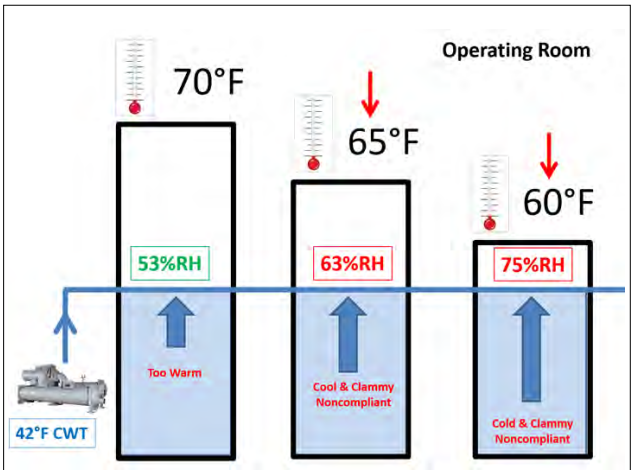


Figure 1.1: What happens when you reduce O.R. space temperature.

You can see what happens in Figure 1.1 when the space thermostat setpoint is lowered from 70°F (21.1°C) down to 60°F (15.6°C), upon the surgeon's request for a more comfortable environment.

While 42°F (5.6°C) CWT can easily provide air cold enough to maintain a 60°F (15.6°C) space temperature, the cooling coil's surface can only be chilled to approximately 45°F (7.2°C). This drastically limits the ability of the coil to condense enough moisture from the air to achieve a corresponding low dew-point temperature, and results in an increase in O.R. relative humidity whenever the space temperature is lowered.

With higher relative humidity, less evaporation of perspiration is occurring, and staff continue to perspire underneath their gowning. Sweat is also being absorbed into their clothing, making it wet, resulting in distracted and disgruntled surgeons and staff. At this point, O.R. relative humidity may be well outside of compliance with healthcare codes and standards which mandate a maximum of 60% RH be maintained.

CURE:

1. Raising O.R. space temperature (with reheat) may lower the relative humidity, but if the resulting temperature becomes too warm surgeon comfort may still be sacrificed.
2. Adjust the thermostat's cooling setpoint downward to that temperature which coincides with a space relative humidity that remains within compliance to applicable healthcare codes and standards for O.R. environments. Understand that a colder space temperature, along with a higher relative humidity, may be less comfortable for staff than a higher temperature coinciding with a lower relative humidity. The evaporation of perspiration from the surgeon's skin and gowning is paramount to their satisfaction.
3. Lowering the CWT cold enough to properly dehumidify the air may be deemed necessary for O.R. staff comfort and productivity. This solution is very limited in its practicality if chillers were not originally sized for this change, as it may negatively impact the performance, efficiency, and capacity of the entire HVAC chilled water system.
4. Facilities dealing with consistently high space relative humidity, or excursions in humidity that create negative consequences in the O.R., should be analyzed for HVAC equipment and controls upgrades specifically designed to handle the stringent dehumidification demands of critical care environments.

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Complaint.

At times, it 'rains' in the operating room, with water dripping from surfaces.



CAUSE:

"Raining" in the O.R. (as it may be referred to) is the occurrence of liquid condensation on cold surfaces. This condensate can accumulate and drip into the space, onto sterile medical instruments, onto surgical staff, or perhaps into the surgical opening of a patient.

Moisture in the air can be condensed on any surface which has been chilled below its dew-point temperature, much in the same way high humidity in the air is condensed onto a cold cooling coil, or onto a cold can of beer on a hot, humid summer day. This phenomenon occurs in the O.R. when surfaces have been chilled below the humidity equilibrium (dew-point) of the surrounding air. This chilling effect on surfaces is usually a direct result of a temperature setpoint which has been lowered at the request of surgeons and staff.

When this condensation occurs during surgery, it places the procedure at considerable risk. Water harbors microbial contamination, some of which may be harmful or deadly if a patient is exposed and cross-contamination occurs. It is a concern regarding the occurrence of surgical site infections (SSIs), hospital acquired infections (HAIs), and jeopardizes any healthcare code compliance as the O.R. is usually well above 60% RH at this point.

CURE:

1. In these situations, raising O.R. temperature (with reheat) may help warm chilled surfaces above the air's dew-point temperature, while also lowering the space relative humidity to begin mitigating condensation, but if the situation has already occurred, it's an effort employed too late. In addition, if the resulting space temperature becomes too warm, surgeon comfort may be sacrificed.
2. Monitor the combination of O.R. temperature and relative humidity to determine its dew-point, and ensure it always remains well below the temperature of any chilled surfaces in this space. Overhead HVAC supply air registers are usually going to be the coldest object, are constructed from non-porous material which easily drips water, and therefore may be the first point of concern with moisture condensation. The grille's surface temperature will approximate that of the HVAC system supply air. If the leaving air temperatures from the grille is 55°F (12.7°C) then the space dew-point temperature should be maintained at least 4°F (2.2°C) lower, so no higher than 51°F (10.5°C). Note that under these conditions and with lower space temperatures, the O.R. may be above 70% RH, therefore, much lower supply air dew-point temperatures are usually required. This is not achievable with chilled water temperatures of 42°F (5.6°C).
3. Measure and control O.R. conditions to maintain relative humidity below the maximum mandated in applicable healthcare codes and standards for the facility. This usually calls for an upper limit of 60% RH.
4. As relative humidity in the space rises above code mandated maximums, your choice(s) in reducing it include lowering the chilled water temperature to HVAC system cooling coils, applying terminal reheat to warm the air, or both. This should be an automated function through the controls system which safeguards the space. Note that if the resulting space temperature becomes too warm, surgeon comfort may be sacrificed.
5. Facilities dealing with consistently high space relative humidity, or excursions in humidity that create negative consequences in the O.R., should be analyzed for HVAC equipment and controls upgrades specifically designed to handle the stringent dehumidification demands of critical care environments.

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Complaint.

On days when outdoor relative humidity is low, why does the humidity in the hospital facility increase when more ventilation air is introduced?

CAUSE:

Relative humidity alone has no significance in determining the actual amount of water vapor (moisture) contained in a particular sample of air, and it's the amount of moisture in the air we are concerned with when designing air-conditioning and dehumidification systems that can properly remove it. As its name implies, relative humidity is a "relative" term, and must be considered in combination with temperature to determine the amount of water vapor an air sample contains by weight, or in grains per pound.

Location	Temperature	Relative Humidity	Moisture
Indoors	70°F	55%	60.2 gr/lb
Outdoors	89°F	40%	82.1 gr/lb

Air at a higher grains per pound (gr/lb) contains more water vapor
There are 7000 grains in one pound of water

Figure 1.2: The air's moisture content

Don't be fooled into thinking that just because an air sample has a low relative humidity, it is always "drier" than that which is at a higher relative humidity. This leads to facility operators mistakenly bringing in "moister" outdoor ventilation air in a misguided attempt to save energy on the HVAC system's operation.

Figure 1.2 shows two ambient air conditions: one is indoors at a higher relative humidity, while the other is outdoors at a lower relative humidity. As can be seen, the outdoor air contains much more moisture in this case. Limiting the amount of this air brought into the HVAC system, while always maintaining healthcare code required ventilation rates, would be less taxing on the HVAC equipment.



CURE:

1. Always maintain healthcare code required outdoor ventilation rates. These should be measured and monitored to ensure compliance.
2. Don't arbitrarily bring in excess outdoor ventilation air (above code minimum) without first understanding the psychrometric properties of both the indoor and outdoor air conditions. If you increase ventilation air, have a sound reason for doing so. If you bring in additional outdoor air, understand that it may negatively impact space relative humidity and pressurization balances.
3. Facilities dealing with consistently high space relative humidity, or excursions in humidity that create negative consequences in the O.R., should be analyzed for HVAC equipment and control upgrades specifically designed to handle the stringent dehumidification demands of critical care environments.

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Summary.

Many times, surgeons seeking relief from heat stress will demand “colder” operating room temperatures, when what they really need is “drier” space air to assist in evaporating perspiration from their skin and garments.

Battling the environment in hospital operating rooms doesn’t have to be a fight that is always lost. There are resolutions to help hospital engineers and facility managers deal with the consistent problem of high relative humidity in these spaces. While some are a temporary “Band-Aid” style approach, permanent solutions are available including solid desiccant dehumidification, a proven HVAC technology that can ensure compliance with healthcare codes and standards while catering to the demands of surgeons and staff seeking a more comfortable and productive environment.

Please reach out to Innovative Air Technologies and allow one of our dehumidification experts to help you analyze the most cost-efficient and sustainable solution to handle your needs. For more information, scan the QR code to access our website.

POINT OF DIMINISHING COMPLAINT

Many times lower RH values may be necessary to create an environment which can absorb perspiration (evaporate sweat) and remove heat through multiple layers of clothing and into the surrounding dry air.

60°F @ 40% RH

Approximately 1,060 Btu/lb of “moisture” evaporated.



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References.

1. ASHRAE HVAC Design Manual for Hospitals and Clinics, Second Edition, 2013.
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