

Welcome to the ASHRAE TC 9.9 Virtual Meeting!

No need to say hello, we will begin
promptly at 10:00 am EDT

Agenda

- Introduction and TC 9.9 Overview
- Programs, Research, Handbook
- Liaison Reports
- IT Subcommittee
- Conclusions



Housekeeping

Audio

- Attendees are muted upon entry
- Do not un-mute your line
- If you are joining via computer and phone line, ensure both are muted

Video

- We encourage you to keep your video off
- If you do enable your video, be mindful that you are on display! Turn off your video when needed.

Q&A

- Use the chat function to ask questions
- Our moderator will share questions throughout the presentation with the speaker to answer.
- If you need to speak, please use the Raise Hand button and the moderator will enable your microphone.

Attendance

- Please complete the attendance form found at the URL at the bottom of this slide

Recording

- This session will be recorded for the purpose of recording meeting minutes.



Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment

ASHRAE Summer Conference 2020
Virtual

Full Zoom Window

Speaker (points to the Talking bar)

Participant panel (points to the Participants list)

Raise hand (points to the Raise Hand button)

Chat panel (points to the Chat section)

Audio options (points to the Join Audio button)

Mute / unmute audio (points to the Mute button)

Turn video on / off (points to the Start Video button)

Toggle chat panel on/off (points to the Chat button)

Audio and Video ON (points to the Mute and Stop Video buttons)

Audio and Video OFF (points to the Unmute and Start Video buttons)



ASHRAE TC 9.9 Attendance Record

ASHRAE Technical Committee 9.9 - Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment
2020 Summer Meeting
Virtual Event Timing: July 13, 2020
Event Address: <https://zoom.us/j/98605846801?pwd=WXFoUjhLVXBWRUhhQmZkdzkyR0g5TndLZz09>
Contact us at tc99chair@gmail.com
Technical Committee Website: <http://tc0909.ashraetcs.org>

* Required

Name *

Your answer

Email

Your answer

Organization

Your answer

Attendance is being recorded using a Google Form. Please make sure you complete the form at:

<https://bit.ly/tc99-virtual-attendance>

As members of ASHRAE or participants in ASHRAE committees, we pledge to act with honesty, fairness, courtesy, competence, integrity and respect for others in our conduct.

- A. Efforts of the Society, its members, and its bodies shall be directed at all times to enhancing the public health, safety and welfare.
- B. Members and organized bodies of the Society shall be good stewards of the world's resources including energy, natural, human and financial resources.
- C. Our products and services shall be offered only in areas where our competence and expertise can satisfy the public need.
- D. We shall act with care and competence in all activities, using and developing up-to-date knowledge and skills.
- E. We shall avoid real or perceived conflicts of interest whenever possible and disclose them to affected parties when they do exist.
- F. The confidentiality of business affairs, proprietary information, intellectual property, procedures, and restricted Society discussions and materials shall be respected.
- G. Each member is expected and encouraged to be committed to the code of ethics of his or her own professional or trade association in their nation and area of work.
- H. Activities crossing national and cultural boundaries shall respect the ethical codes of the seat of the principal activity.

Monday, July 13, 2020
TC 9.9 Main Meeting
10:00 AM – 1:00 PM ET
Location: Virtual

Topic		Time	Presenter
Introduction	Welcome and Introductions	5	Dustin Demetriou
	Webmaster	5	Ecton English
	TC 9.9 Update	15	Dustin Demetriou
Program		10	Nick Gangemi
Research	1675-RP: Guidance for CFD Modeling	15	Mark Seymour
	Sea Salt Work Statement	5	Roger Schmidt
Handbook	Chapter 20	5	Bob McFarlane
International	International Update	5	Don Beaty
Break		15	
Liaison Reports	Standard 90.1	10	Rick Pavlak
	Standard 90.4	10	Dave Kelley
	SPC-127	10	John Bean
	AHRI 1360	10	Dave Kelley
	SSPC 300, Guideline 1.6	10	Terry Rodgers
	Building EQ Methodology Subcommittee	15	John Constantinide
IT Subcommittee	Edge Computing White Paper	10	Jon Fitch
	Thermal Guidelines 5 th Edition	5	Roger Schmidt
	IEC Connector Harmonization	5	Roger Schmidt
	Cold Weather Shipping White Paper	5	Joe Prisco



Mission Critical Facilities, Data Centers,
Technology Spaces and Electronic Equipment
ASHRAE Technical Committee 9.9

- Home
- Membership
- Meetings
- Documents
- Functions
- More

Agenda

Upcoming TC Meetings

Location: Orlando, FL	
Sunday, 2/2/2020	Room
5:00 PM - 7:00 PM - Programs, Handbook and Research	TBD
Monday, 2/3/2020	
2:15 PM - 7:30 PM - Main Committee	TBD

TC 9.9 sponsored seminars, conference paper session, data center related topics, etc. will be posted for each conference in the [Meetings](#) section of this website.

[See More >](#)

Minutes

- [TC0909 ASHRAE Kansas City Meeting Minutes 20190624](#)
- [TC0909 ASHRAE Atlanta Meeting Minutes 20190130](#)
- [TC0909 ASHRAE Houston Meeting Minutes 20180624](#)
- [TC0909 ASHRAE Chicago Meeting Minutes 20180121](#)
- [TC0909 ASHRAE Long Beach Meeting Minutes 20170626](#)

[See All >](#)

Committee Chair

Dustin Demetriou TC0909@ashrae.net

Committee Scope

TC 9.9 is concerned with all aspects of mission critical facilities, data centers, technology spaces, and electronic equipment/systems.

[More >](#)

Upcoming Society Conferences

2020 Winter Conference
Feb 1-5, 2020
Orlando, FL

Conference Badges

<http://tc0909.ashraetcs.org>

Title

- Mission Critical Facilities, Data Centers, Technology Spaces, and Electronic Equipment

Purpose

- To be recognized by ALL areas of the datacom industry as the UNBIASED engineering leader in HVAC and an effective provider of technical datacom information.

Scope

- All things datacom facilities: datacom refers to data processing and communication facilities. It includes rooms or closets used for communication, computers, or electronic equipment

Participants

- TC 9.9 is the largest and most active TC with over 400 members

Representatives

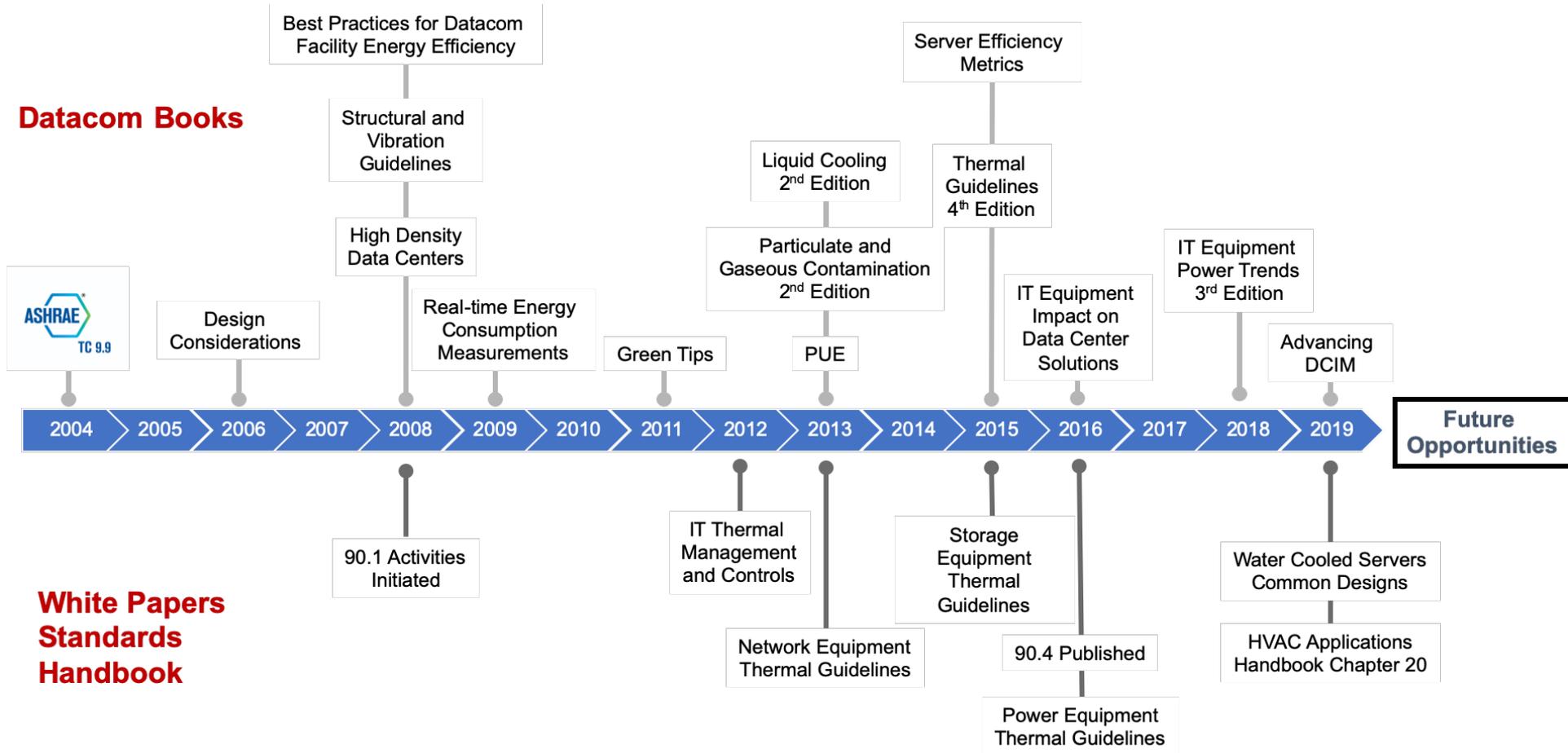
- Producers of Datacom Equipment: computing hardware, software, and services
- Producers of Facility Equipment: HVAC, software, DCIM, rack solutions
- Users of Datacom Equipment: facility owners, operators, managers
- General Interest: government agencies, utilities, consultants, academia, testing laboratories

Industry Volunteers Provide the Expertise

- Manufacturers, consultants, researchers, universities, utilities, regulators, contractors, and government

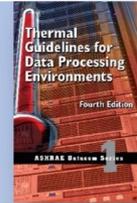
Areas of Influence

- Standards
- Research
- Handbook
- Programs (including paper reviews)
- Technical Activities: Books, White Papers, Education



Essentials of Data Center Design

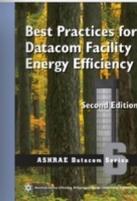
Establish a Baseline



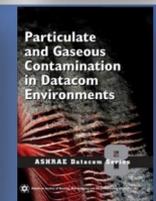
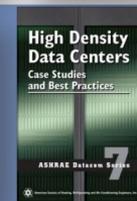
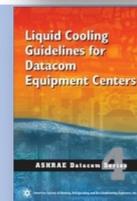
Target Forecasts and Trends



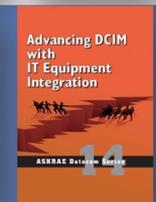
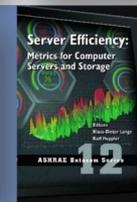
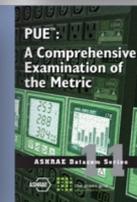
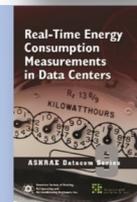
Engage in Best Practices



Prepare for Special Cases



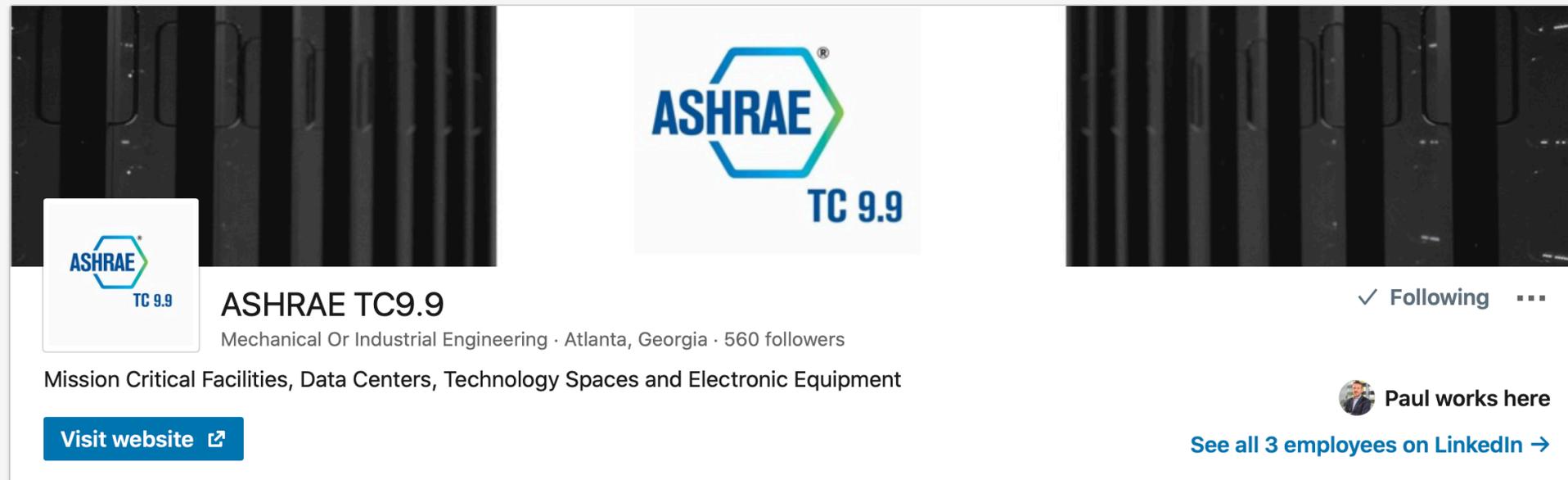
Measure Key Metrics



Latest TC Activities

If you would like to get involved in this TC's activities you can contact the appropriate Point of Contact in the [TC 9.9 Work Items listing](#), attend the biannual meetings, or contact our committee chair at tc0909@ashrae.net.

- Datacom Series Books
 - Design Considerations for Datacom Equipment Centers, 2nd Edition
 - Thermal Guidelines for Data Processing Environments, 5th Edition
- Research
 - 1675-RP, Guidance for CFD Modeling of Data Centers
 - Work Statement, Study of the Level of Filtration Required to Maintain Reliable Operation of ITE in Data Centers Located in Coastal Regions with High Sea Salt Concentrations
- White Papers / Technical Briefs
 - Cold Weather Shipping Acclimation and Best Practices
 - Liquid Cooled Solutions : What's New, Debunking the Myths, & Value Proposition
 - Impact of Human Health for Hot Aisle Containment Solutions



 **ASHRAE TC9.9**
Mechanical Or Industrial Engineering · Atlanta, Georgia · 560 followers

Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment

[Visit website](#)

✓ Following ...

 Paul works here

[See all 3 employees on LinkedIn](#)

<https://www.linkedin.com/company/18665978>

ASHRAE TC 9.9 Officers & Membership

Effective August 1, 2020

Chair		Dustin Demetriou, <i>IBM</i>
Vice Chair		John Groenewold, <i>JP Morgan Chase</i>
Secretary		Matt Koukl, <i>Affiliated Engineers</i>
Research Subcommittee Chair		Mark Seymour, <i>Future Facilities</i>
ITE Subcommittee Chair		Dr. Roger Schmidt, <i>IBM Fellow Emeritus Syracuse University</i>
Standards Subcommittee Chair		Rick Pavlak, <i>Heapy Engineering</i>
Program Subcommittee Chair		Nick Gangemi, <i>Northern Air Systems</i>
Handbook Subcommittee Chair		Robert McFarlane, <i>Shen Milsom & Wilke, LLC</i>
Membership Subcommittee Chair		Jack Glass, <i>Citigroup retired</i>
Webmaster		Ecton English, <i>Department of Defense</i>
Marketing Subcommittee Chair		Paul Finch, <i>KAO Data</i>

- Standard 90.1: Rick Pavlak
- Standard 90.4: Dave Kelley
- Standard 127: John Bean
- International: Don Beaty
- MTG Cybersecurity: Ecton English

1. Gerardo Alfonso, Ingeal
2. John Bean, Schneider Electric
3. Don Beaty, DLB
4. Lex Coors, Interxion Headquarters
5. Dave Kelley, Vertiv
6. Dustin Demetriou, IBM
7. Ecton English, DoD
8. John Gross, J.M. Gross Engineering
9. Matt Koukl, Affiliated Engineers
10. Dave Meadows, Stultz America
11. Dave Moss, Dell
12. Chris Muller, Purafil
13. Terry Rogers, Primary Integration
14. Roger Schmidt, Syracuse University
15. Vali Sorell, Sorell Engineering

1. Gerardo Alfonso, Ingeal
2. John Bean, Schneider Electric
3. Don Beaty, DLB
4. Lex Coors, Interxion Headquarters
5. Dave Kelley, Vertiv
6. Dustin Demetriou, IBM
7. Ecton English, DoD
8. John Groenwald, JP Morgan Chase
9. John Gross, J.M. Gross Engineering
10. Matt Koukl, Affiliated Engineers
11. Dave Meadows, Stultz America
12. Dave Moss, Dell
13. Terry Rogers, Primary Integration
14. Roger Schmidt, Syracuse University
15. Vali Sorell, Sorell Engineering

Vote	Date	Approved
Sea Salt RTAR	April	Yes
Edge White Paper	May	Yes
Orlando Meeting Minutes	June	Yes
Thermal Guidelines 5 th Edition	July	Pending

Provisional Corresponding Members (81 as of 7/2020)

- Newly registered
- Implies participation in committee activities through correspondence or in-person involvement to become corresponding member
- Provisional corresponding members serves up to two, one-year terms
- Chair updates roster to move from provisional to corresponding
 - Roster update always due Tuesday following main meeting during Winter Conference
 - If the chair takes no action on a provisional member, they are dropped from the roster in two years
- Can not be voting members, but after provisional term, may be considered for future voting membership.'
- For purposes of committee assignments and other work "Provisional" status does not limit an individual's active involvement in the work of the committee

Corresponding Members (335 as of 7/2020)

- Full members
- Can be voting members
- Can be nominated/elected as an officer

**Keep Your ASHRAE
Profile Updated!**



Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment

ASHRAE Technical Committee 9.9

[Home](#)[Membership](#)[Meetings](#)[Documents](#)[Functions](#)[More](#)

Member Roster

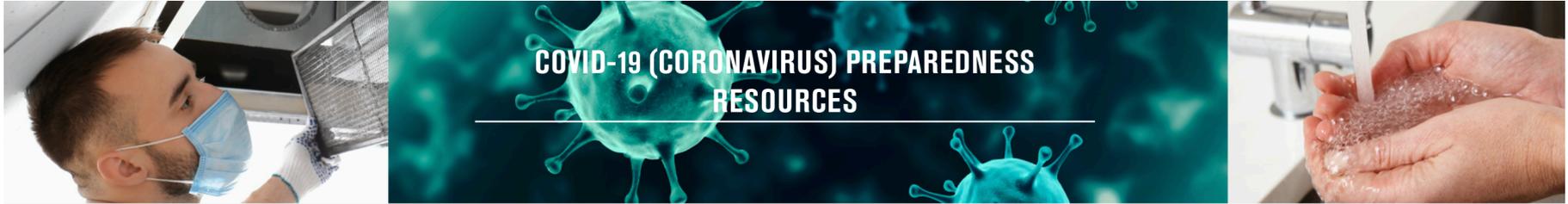
Current as of 6/04/2020

[Join TC 9.9](#)

If you want to become a provisional corresponding member of this TC, click on the "Join TC" button above. You will be automatically added to the roster and will receive all TC communications.

Committee members can download a copy of the complete roster in any of three formats by logging in to their ASHRAE member account, clicking on my account and selecting Committees.

<http://tc0909.ashraetcs.org/membership.php>



COVID-19 (CORONAVIRUS) PREPAREDNESS RESOURCES

SHARE THIS

<https://www.ashrae.org/technical-resources/resources>

Questions? Email COVID-19@ashrae.org

Frequently Asked Questions and Glossary of Terms:

FAQ / GLOSSARY

This page is updated as new information becomes available.

[Main](#) [Reopening](#) [Buildings](#) [Filtration/Disinfection](#) [Transportation](#) [Resources](#)

Message from ASHRAE President Darryl Boyce

Like all businesses around the globe, ASHRAE must react to the ongoing threat of the COVID-19 pandemic. As the Society determines how to respond to the evolving circumstances, our highest priority is the safety and welfare of our volunteers and staff. ASHRAE recently announced the creation of the ASHRAE Epidemic Task Force to help deploy ASHRAE's technical resources to address the challenges of the current pandemic and future epidemics as it relates to the effects of heating, ventilation and air-conditioning systems on disease transmission in healthcare facilities, the workplace, home, public and recreational environments.

Members will be kept informed as ASHRAE adapts to these rapidly changing circumstances. We hope that you and your families are healthy, safe and secure.

Sincerely,

Darryl K. Boyce, PEng., 2019-20 ASHRAE President

NEW Environmental Health Emerging Issue Brief

[Pandemic COVID-19 and Airborne Transmission](#)

Does ASHRAE's guidance agree with guidance from WHO and CDC?

[May 26, 2020](#)

Guidance from the Centers for Disease Control and Prevention (CDC):

[Interim Guidance for Businesses and Employers to Plan and Respond to Coronavirus Disease 2019 \(COVID-19\), February 2020 Coronavirus Situation Summary](#)

Guidance from World Health Organization (WHO):

[Coronavirus disease \(COVID-19\) outbreak](#)

March 23, 2020 | [ASHRAE Letter to WHO](#)

Guidance from Georgia Department of Public Health (DPH):

[COVID-19 \(Novel Coronavirus\)](#)

Messages from ASHRAE

ASHRAE All Member Email Update

March 13, 2020 | [ASHRAE All Member Email Update](#)

ASHRAE Press Releases:

May 7, 2020 | [ASHRAE Offers COVID-19 Building Readiness/Reopening Guidance](#)

April 20, 2020 | [ASHRAE Issues Statements on Relationship Between COVID-19 and HVAC in Buildings](#)

April 20, 2020 | [En Español](#)

March 31, 2020 | [ASHRAE Epidemic Task Force Established](#)

February 27, 2020 | [ASHRAE Resources Available to Address COVID-19 Concerns](#)

ASHRAE leadership has approved the following two statements regarding transmission of SARS-CoV-2 and the operation of HVAC systems during the COVID-19 pandemic.

Transmission of SARS-CoV-2 through the air is sufficiently likely that airborne exposure to the virus should be controlled. Changes to building operations, including the operation of heating, ventilating, and air-conditioning systems, can reduce airborne exposures.

Ventilation and filtration provided by heating, ventilating, and air-conditioning systems can reduce the airborne concentration of SARS-CoV-2 and thus the risk of transmission through the air. Unconditioned spaces can cause thermal stress to people that may be directly life threatening and that may also lower resistance to infection. In general, disabling of heating, ventilating, and air-conditioning systems is not a recommended measure to reduce the transmission of the virus.

[En Español](#)

NEW ASHRAE Position Document on Infectious Aerosols

On April 14, 2020, the ASHRAE Board of Directors approved the ASHRAE Position Document on Infectious Aerosols. This position document replaces the ASHRAE Position Document on Airborne Infectious Diseases. This position document outlines ASHRAE's position that facilities of all types should follow, as a minimum, the latest published standards and guidelines and good engineering practice. Based on risk assessments or owner project requirements, designers of new and existing facilities could go beyond the minimum requirements of these standards, using techniques covered in various ASHRAE publications, including the ASHRAE Handbook volumes, Research Project final reports, papers and articles, and design guides, to be even better prepared to control the dissemination of infectious aerosols.

[ASHRAE Position Document on Infectious Aerosols](#)

[En Español](#)

[En Português](#)

Thank You

TC 9.9 Website

tc0909.ashraetcs.org



Programs Update

**ASHRAE Virtual Summer Meeting
Austin, Texas
June 29-July 2, 2020**

Nick Gangemi, Program Chair

ASHRAE Virtual Summer Meeting

What to Expect

80 on-demand sessions + 12 live sessions = 92 technical sessions at your fingertips for 18 months.

On-demand Technical Program: Available Monday, June 22

- 80 sessions accessible on your terms for 18 months
- Conference proceedings. Download the technical papers, conference papers and extended abstracts.

Live Four Day Event: Monday, June 29 - July 2

- 12 featured technical sessions presented live and available for download
- Sessions addressing the latest information relating to the COVID-19 pandemic
- Live forum for Q&A with speakers
- Access to scheduled live chat sessions with speakers for on-demand sessions
- Virtual networking happy hours with specific topics and social focus
- Leadership Moments providing updates from Society leaders

Chicago January 23-27, 2021

- **Conference Chair:** Maggie Moninski
(maggie.moninski@gmail.com)
- **HVAC&R Fundamentals and Applications:**
 - **Track Chair:** Robert Cox (bob.cox@jacobs.com)
- **Systems and Equipment:**
 - **Track Chair:** Marianna Vallejo
(Marianna.vallejo@jacobs.com)
- **Refrigeration & Refrigerants:**
 - **Track Chair:** Gary Debes (gary.debes@comcast.net)

- **Environmental Health Through IEQ:**
 - Track Chair: Stephen Idem sidem@tntech.edu
- **Building Performance and Commissioning for Operation and Management:**
 - Track Chair: Lee Ribecklee lee.riback@gmail.com
- **Energy Conservation:**
 - Track Chair: NiveditaJadhavnivi2307 NiveditaJadhavnivi2307@gmail.com
- **International Design:**
 - Track Chair: Farhan Mehboob Farhan.mehboob@smehboob.com
- **Standards, Guidelines and Codes:**
 - Track Chair: Kyle Ingekinge kyle.ingeking@peifla.com
- **Mini Track) Virtual Design**

Important Dates –Chicago

Wednesday, March 18, 2020: Conference Paper Abstracts, Technical Papers and Paper Session Requests Due

Wednesday, April 22, 2020:Conference Paper Abstract Accept/Reject Notifications

Monday, June 15, 2020:Website Opens for Seminar, Workshop, Forum, Debate, and Panel Proposals

Wednesday, July 8, 2020:Final Conference Papers Due -Submitted for Review (Includes Bio, Learning Objectives and Methods of Assessment); Request for Conference Paper Sessions Due

Monday, July 27, 2020:Conference Paper Accept/Revise/Reject Notifications

August 3, 2020: Program Submission Deadline

Monday, August 10, 2020:Revised Conference Papers/Final Technical Papers Due

Monday, August 24, 2020:Conference and Technical Paper Final Accept/Reject Notifications

Monday, October 5, 2020:Seminar, Workshop, Forum, Debate, and Panel Accept/Reject Notifications

- **Technical Paper Sessions-**

- These sessions present papers on current applications or procedures, as well as papers resulting from research on fundamental concepts and basic theory.

- **Conference Paper Sessions-**

- Papers on current applications or procedures, as well as papers reporting on research in process.
- These papers differ from technical papers in that they are shorter in length and undergo a much less stringent peer review.

- **Panels-**
 - Panel discussions can feature a **broad range of subjects** and explore **different perspectives** on issues in the industry.
 - A panel **may feature discussions about integrated project delivery** among designers, builders and facility management professionals.
- **Forums-**
 - Forums are “off-the-record” discussions held to **promote a free exchange of ideas**.
 - Limited reporting to allow **individuals to speak confidentially** without concern of criticism.
 - There are **no papers** attached to these forums.

- **Debates-**
 - Debates highlight **hot-button issues**
 - Experts, either on **teams or as individuals**, present **different sides** of an issue in debate format.
 - Each participant **presents evidence for or against** a specific statement or question

- **Seminars-**
 - Seminars feature **presentations** on subjects of current interest.
 - **Papers are not available** from the Society; however, seminar PowerPoint presentations with audio descriptions of the **presentations are posted online.**

- **Workshops-**
 - Workshops enable technical committees and other **ASHRAE committees** to provide a **series of short presentations** on a topic requiring specific expertise.
 - These short presentations are provided with an increased **emphasis on audience participation and training** in a specific set of skills.

Technical Papers:

- Technical Papers are presented by authors at ASHRAE **Winter and Annual Conferences**.
- Technical Papers submitted for review must be both technically accurate and clearly written.
- Technical Papers undergo a **rigorous double-blind review** and must be **approved by three reviewers** knowledgeable in the subject matter.
- Technical Papers can be **up to 30 double-spaced manuscript** pages in length, including tables and charts, and a maximum of 12 figures (not counted in the page count).
- Accepted Technical Papers are **available as hard-copy preprints** in the bookstore during the conference.
- The Technical Papers must be presented at the conference in order to be **published in *ASHRAE Transactions***, where they will be included with questions and answers (if any).

Conference Papers:

- Conference Papers are **shorter than Technical Papers**, undergo a **less stringent review** and can be **prepared closer to the conferences**.
- Unlike Technical Papers, **abstracts** of Conference Papers are **submitted first** for review.
- Upon acceptance, papers are due three months after abstract acceptance, **undergo a single-blind review** (the author(s) names are included in the paper; however, reviewer's remain anonymous), and must be **approved by two reviewers**.
- Upon approval, papers are scheduled for oral presentation.
- Conference Papers can be **no more than 8 single-spaced pages** in length total (includes text, tables, figures, etc.).

Nick Gangemi, Program Chair

585-721-8795

Nick.GANGEMI@bureauveritas.com

TC 9.9 Research Update

Current Activity

- Two current activities:
 - RTAR/WS development “Study of the Level of Filtration Required to Maintain Reliable Operation of Information Technology Equipment in Data Centers Located in Coastal Regions with High Sea Salt Concentrations”
 - RP-1675 “Guidance for CFD Modeling of Data Centers”

1675-RP: Guidance for CFD Modeling of Data Centers

Scope

The scope of the present study is to provide modeling guidance associated with a few clearly-defined data center configurations which will be studied both experimentally and with CFD. Emphasis is to be placed on how to model various objects and features that critically affect data center cooling performance in a manner appropriate for a given application and simulation goals.



1675-RP: Guidance for CFD Modeling of Data Centers

Personnel

Prime Contractor

Cheng-Xian (Charlie) Lin and Beichao Hu

Florida International University



Laboratory Experimental Subcontractor

Yogendra Joshi and Dhaval Patel

Georgia Institute of Technology



Georgia Institute of Technology

- Summary of Recent Progress
- Project Timeline Estimate
- Plans for the Next Few Months
- Experimental Work Update (GA Tech)
- CFD Work Update (FIU)

- Experimental work:
 - Testing data are being collected
 - Verification of server and instrumental setup
- CFD work:
 - Numerical simulations are conducted simultaneously
 - Temperature and velocity results are being compared to testing data
- Project management:
 - Multiple technical consultations with some PMS members
 - FIU and GA Tech weekly online meetings
 - Subcontract between FIU and GA Tech extended to 12/31/2020
 - Plan for o cost extension to 1675-RP to end on 03/31/2021

Project Timeline Estimate

	Tasks/Milestones	Deadline Month	Projected End Date	Status
1	Complete baseline CFD model of lab space (review model and assumptions with PMS in advance)	03/2019	03/09/2019	Complete
2	Create CFD models of design alternatives as specified in contract to identify/clearly define all scenarios which will be studied experimentally	03/2019	03/31/2019	Complete
3	Complete full characterization of second server simulator prototype	02/2019	02/15/2019	Complete
4	Receive balance of 40 server simulators	03/2019	03/31/2019	Received, 4/4/19
5	Install server simulators in lab and prepare for testing	03/2019	05/08/2019	Complete
6	Commence experimental testing	04/2019	05/31/2019*	Started, 11/10/2019
7	Complete experimental measurements for baseline scenario	07/2020	07/16/2020	In progress*
8	Complete experimental measurements for alternative scenarios	08/2020	08/13/2020	In progress*
9	Present initial findings	06/2020	06/05/2020 (virtual)	In progress*
10	Present revised/final findings	09/2020	09/30/2020	
11	Decommission lab space	10/2020	10/31/2020**	
12	Produce rough outline of CFD guidelines	11/2020	11/15/2020	
13	Produce rough draft of full report of CFD guidelines	12/2020	12/31/2020	
14	Produce final report of CFD guidelines	03/2021	03/31/2021	
15	Formally close project (currently aiming for April 30, 2021)	04/2021	04/30/2021	

Covid-19 ?

* It depends on when the Lab will be fully open
 ** TBD

- Install the blockage in GA Tech Lab for Task 3
- Complete all the testing tasks at GA Tech
- Complete all the CFD work on validation, analysis, and guideline development
- Prepare the final report to ASHRAE

Experiment Update

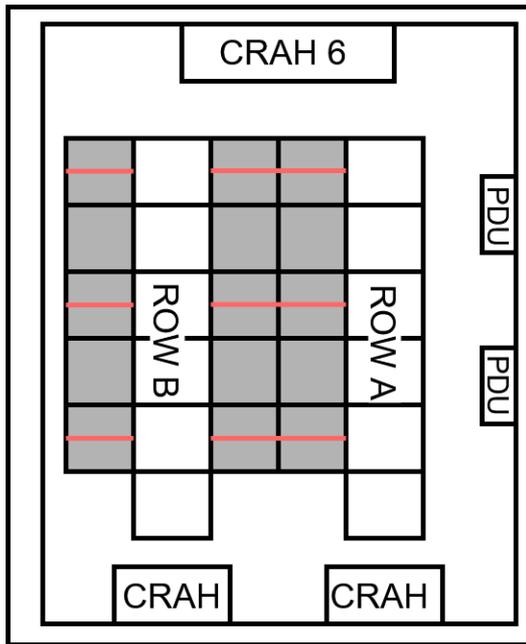


Figure 1 – Room layout. Red line shows the racks temperature measurements were taken in.

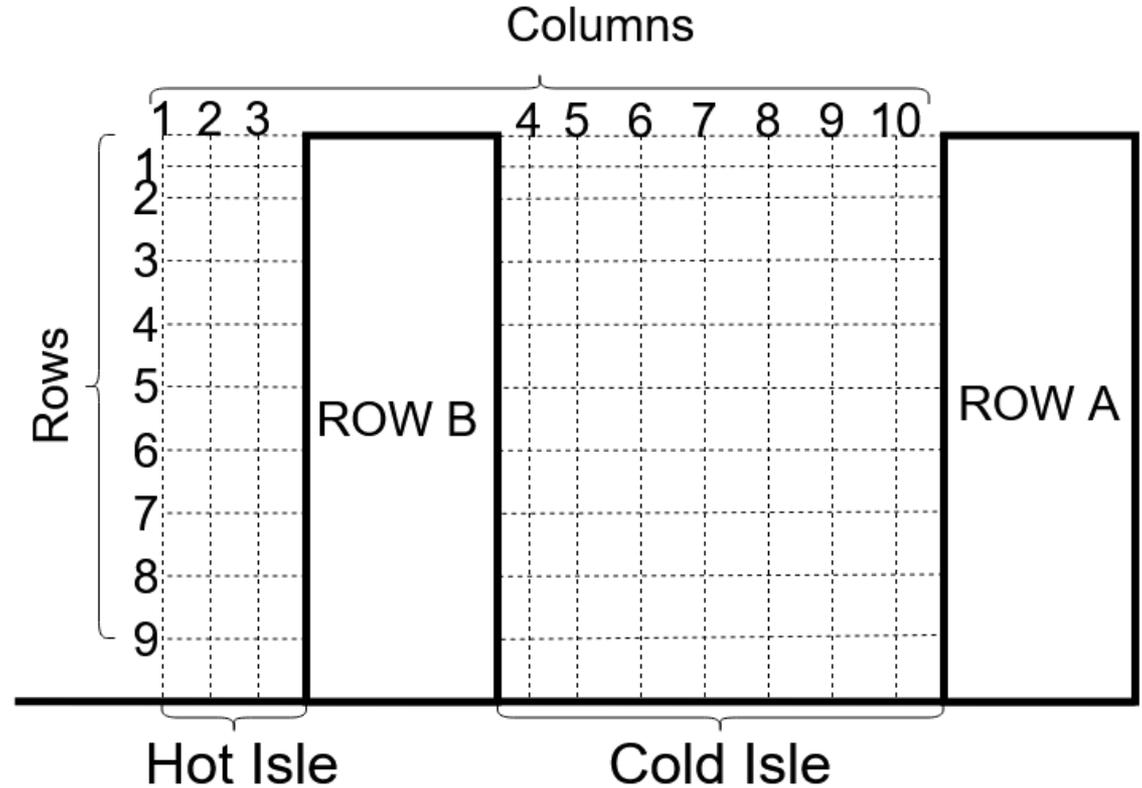
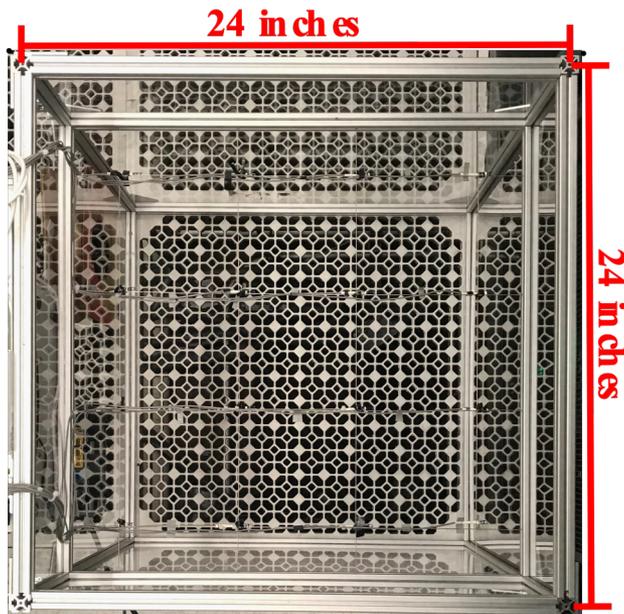
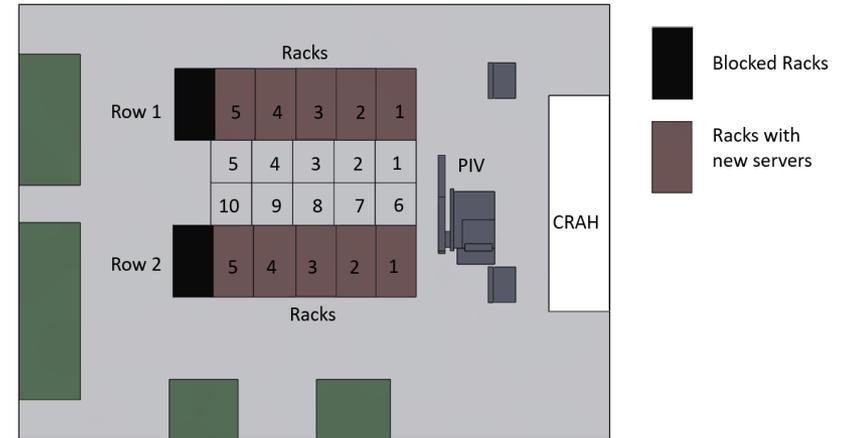
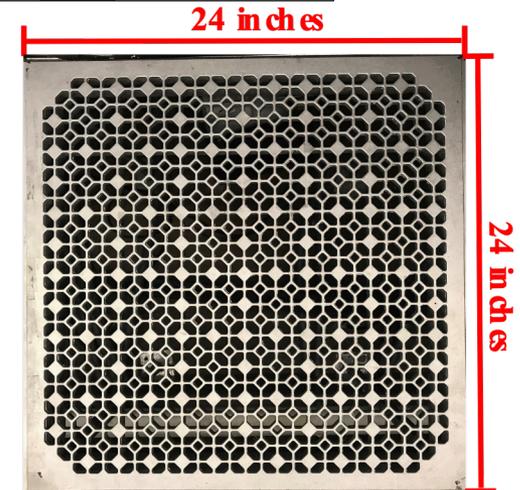


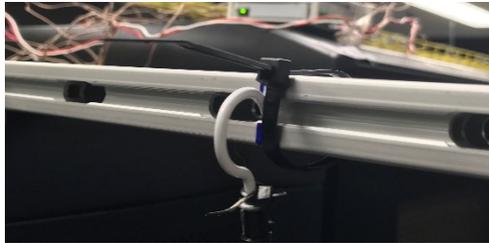
Figure 2 – Rack layout. Intersection between the numbered dotted lines represents the sensor placement.

- Figure to the top right shows the layout in the lab

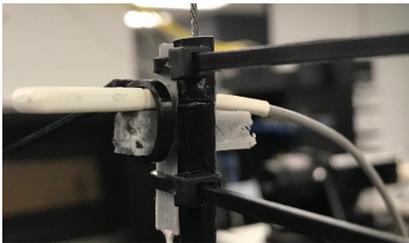


- Figure to the left shows the tool used to measure the tile air flow rate, and the tile to the right are tiles being used for the current project.

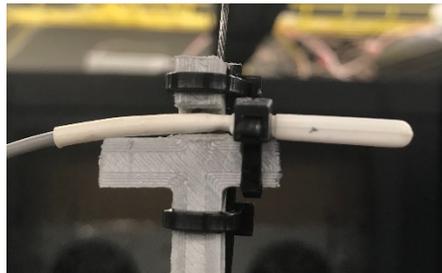




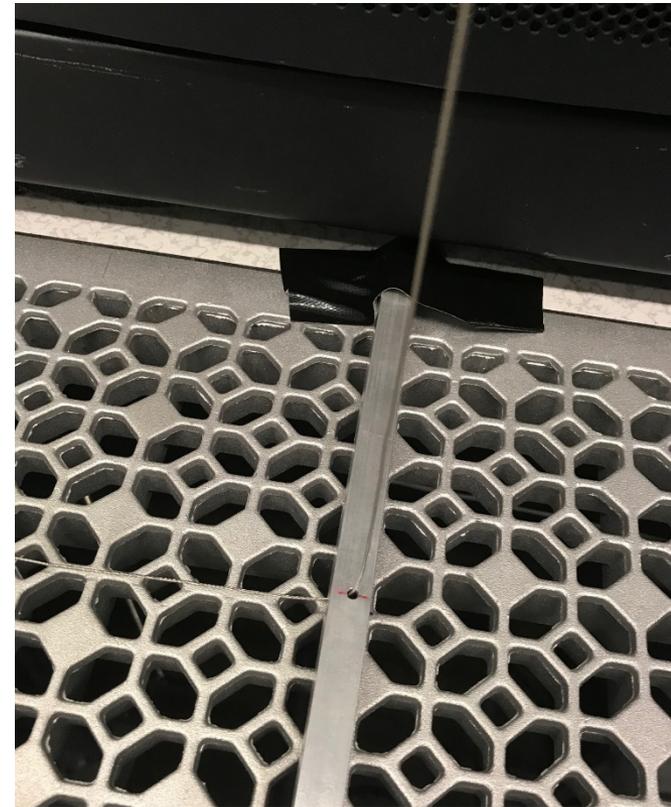
Hook connected to T-slotted frame. The hook is used to hold up the sensor wire.



The plastic "+" is attached to the sensor wire with zip ties. Duct tape is used to mark distances for the sensor deployment.



Side profile of the sensor and plastic "+".



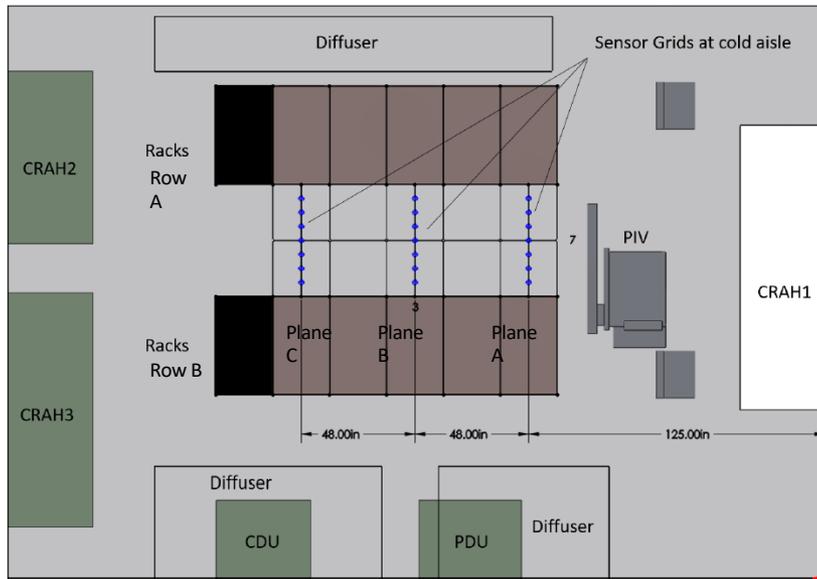
Sensor grid wire attached to rectangular tube. The tube is held to the ground using duct tape.

- Measurements were taken but discrepancies found between experiment and computation setups
- Updated the lab geometry in computational model
- In process of building a more mechanically stable sensor deployment
- Testing the air flow rate through server simulators has shown some variations

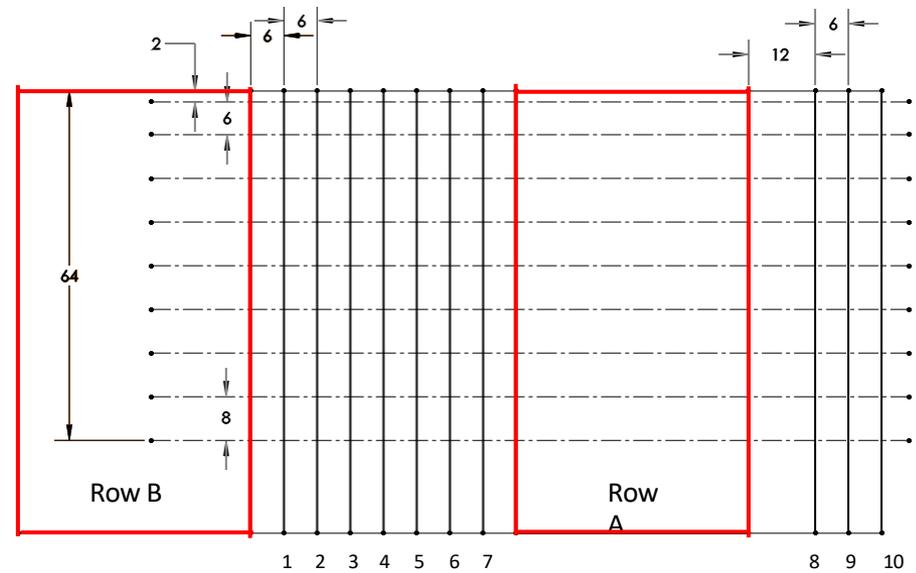
- Approximately 8 weeks to complete the study once access to the lab is available.
- Georgia Tech on-campus research reopened on June 18th but some other issues have still prevented significant lab access
- 1st week – Sensor redeployment
- 2nd to 6th week – Experiments 1-19
- 7th week – Experiments 20 & 21; plenum blockage
- 8th week – Experiments 22-25

CFD Modeling Progress

- Room level CFD result comparison based on three baseline cases (Undersupplied, balanced, and oversupplied)
- In progress of finding the reason of discrepancy between CFD and experiment
- Geometric model updates
- Air entrainment study
- Server flow rate study

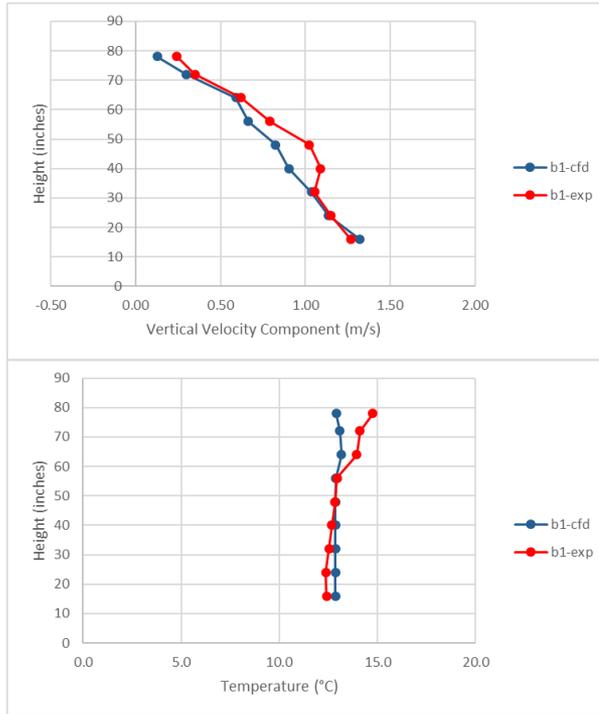


Server room layout

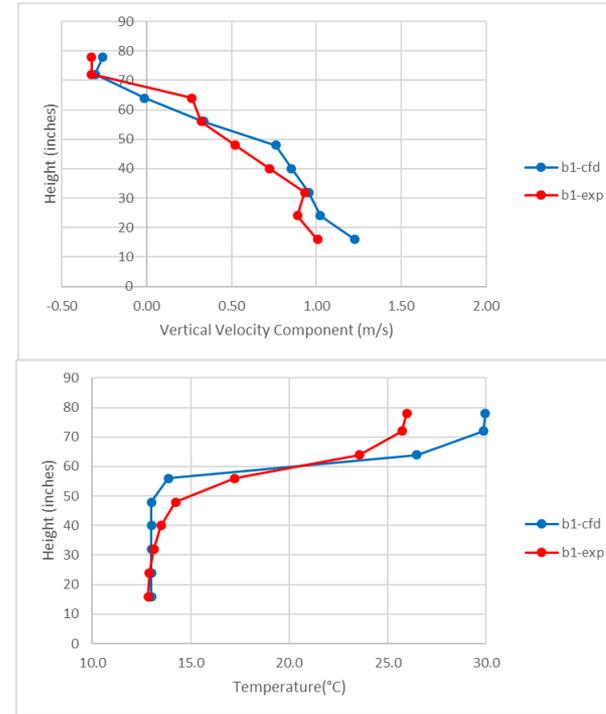


Sensor layout

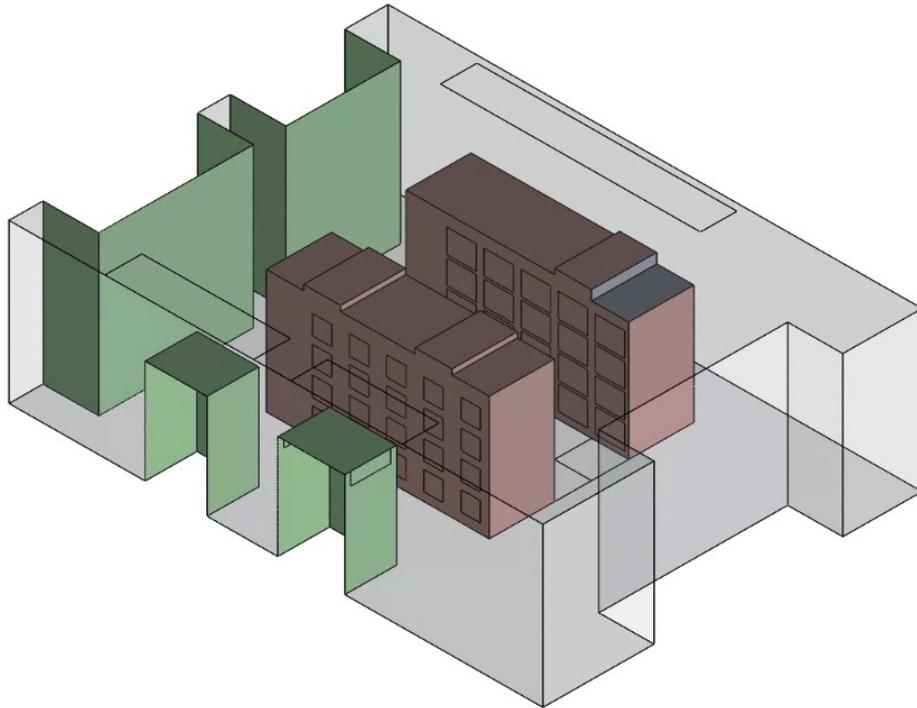
Result Comparison at Selected Locations



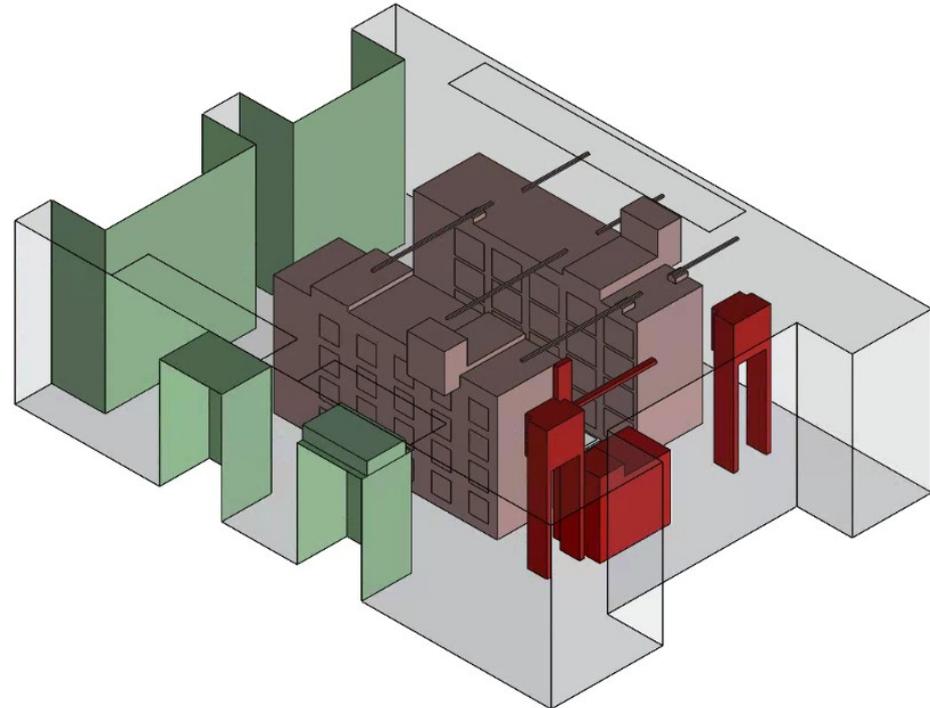
Result comparison for a
oversupplied baseline case



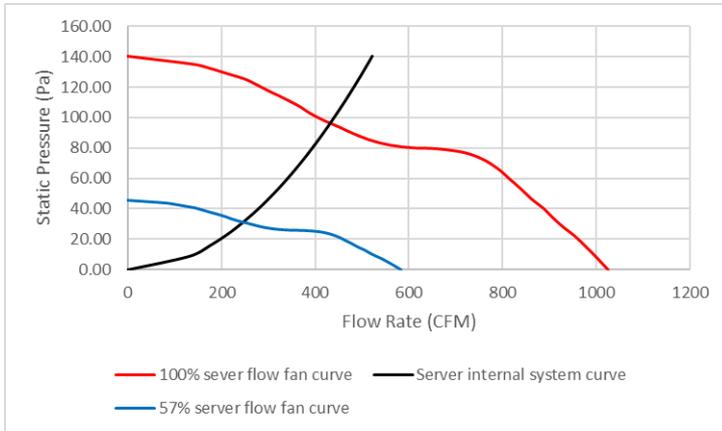
Result comparison for an
undersupplied baseline case



Previous geometry
(Only room is shown)



Latest geometry
(Only room is shown)

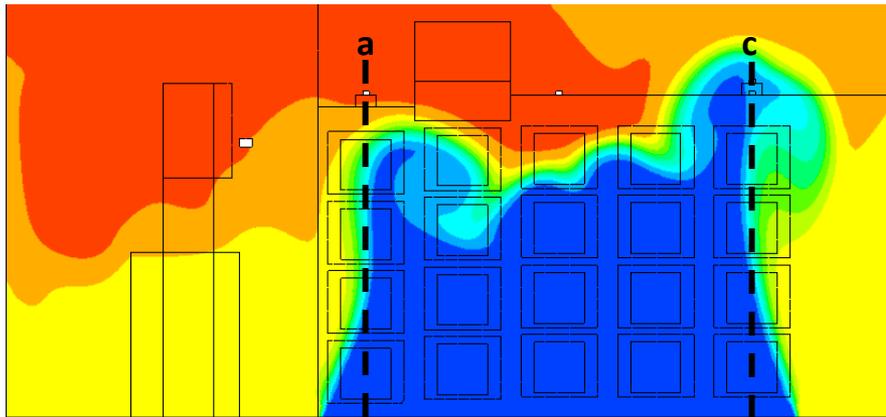
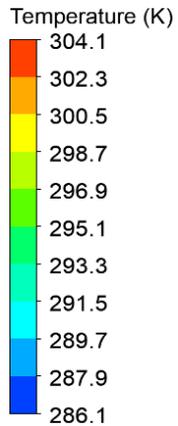


Fan curve of the server simulator

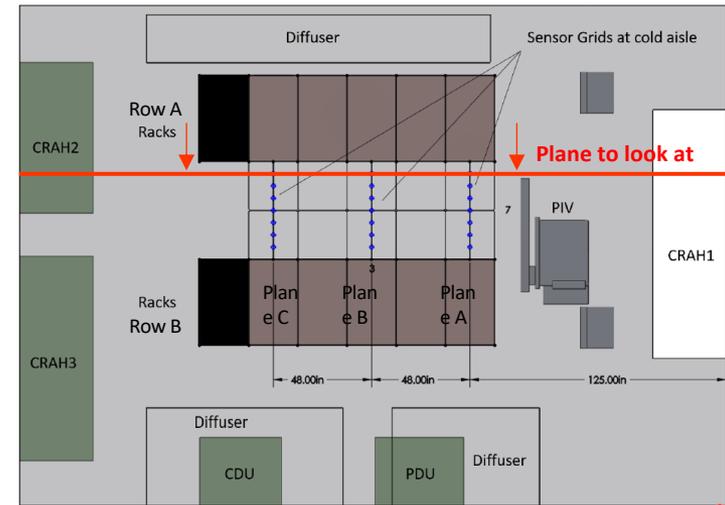
Effect of the external pressure drop on server flow rate

External pressure drop (Pa)	Flow rate change (%)
1	-5
2	-9
3	-14
4	-18
5	-22

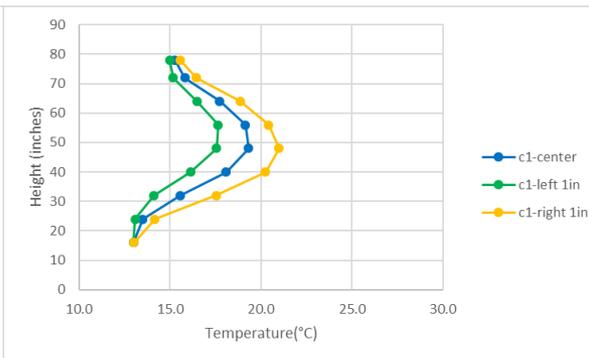
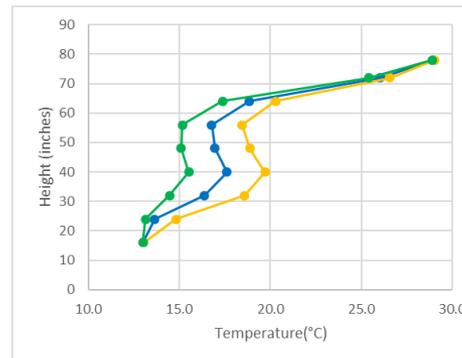
The external pressure drop caused by the rack and other resistance could reduce the server flow rate by 5 to 15% from what we expect. This is also confirmed by the experiment.

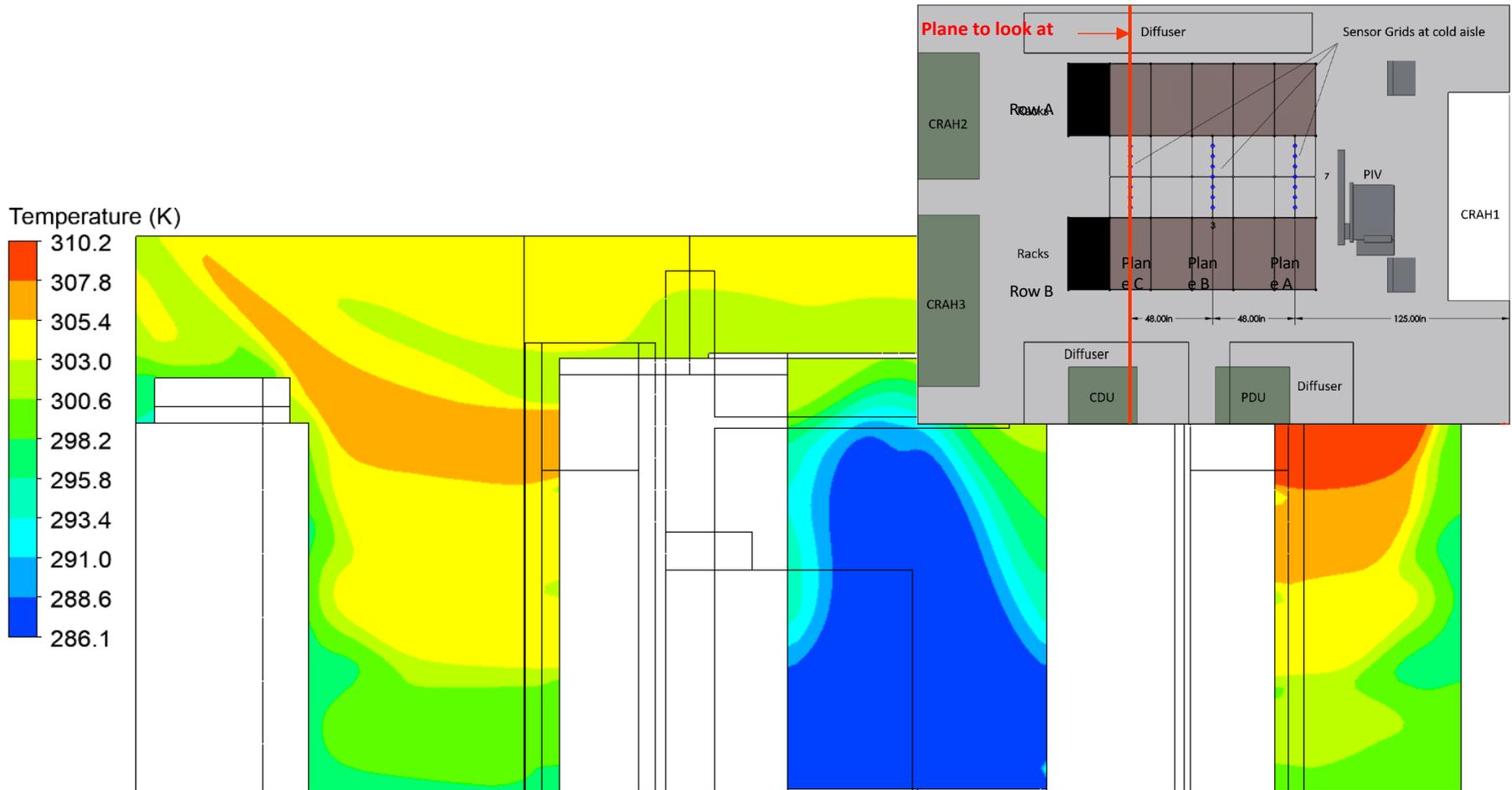


Temperature contours in a plane in front of Row A:
Undersupplied case

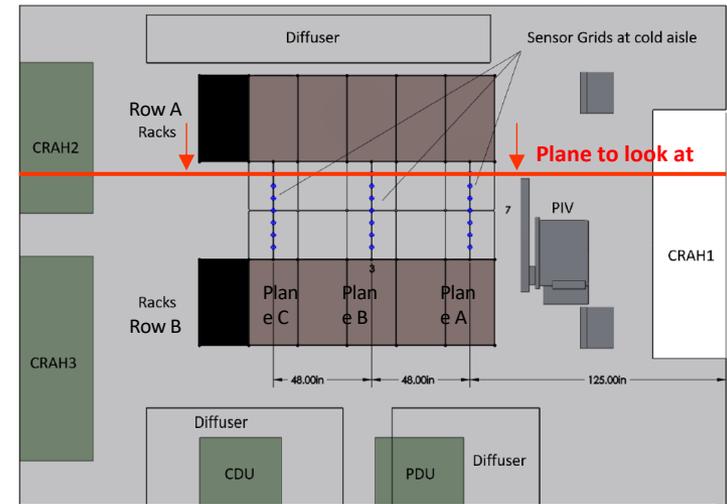


- The temperature gradient near the entrainment is about 3K/inch
- Thermal profile is highly sensitive to the location of the entrainment
- Thermal profile of the CFD should be interpreted more cautiously, because it could dramatically overpredict or underpredict the temperature as shown in the graph.

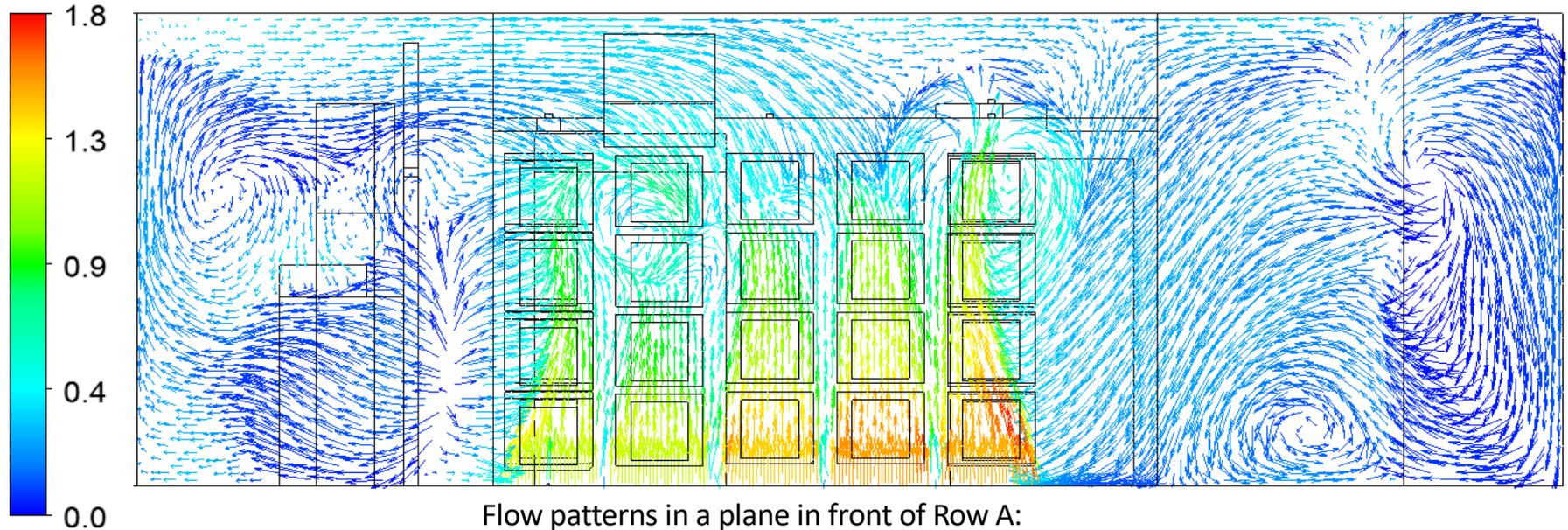




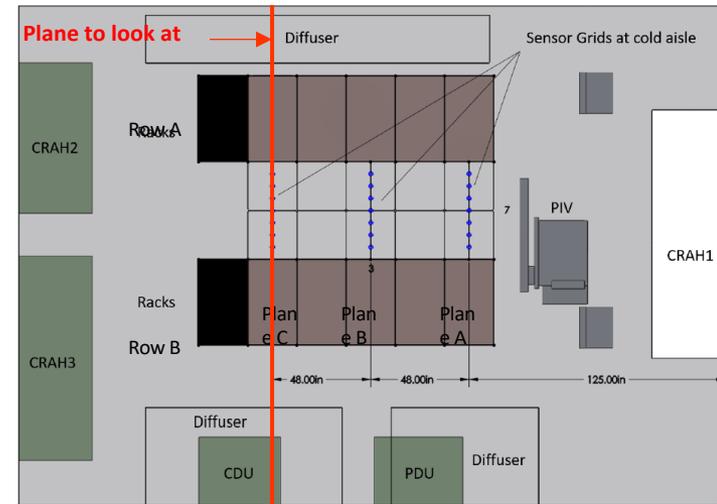
Temperature plane in measurement plane C:
Undersupplied case



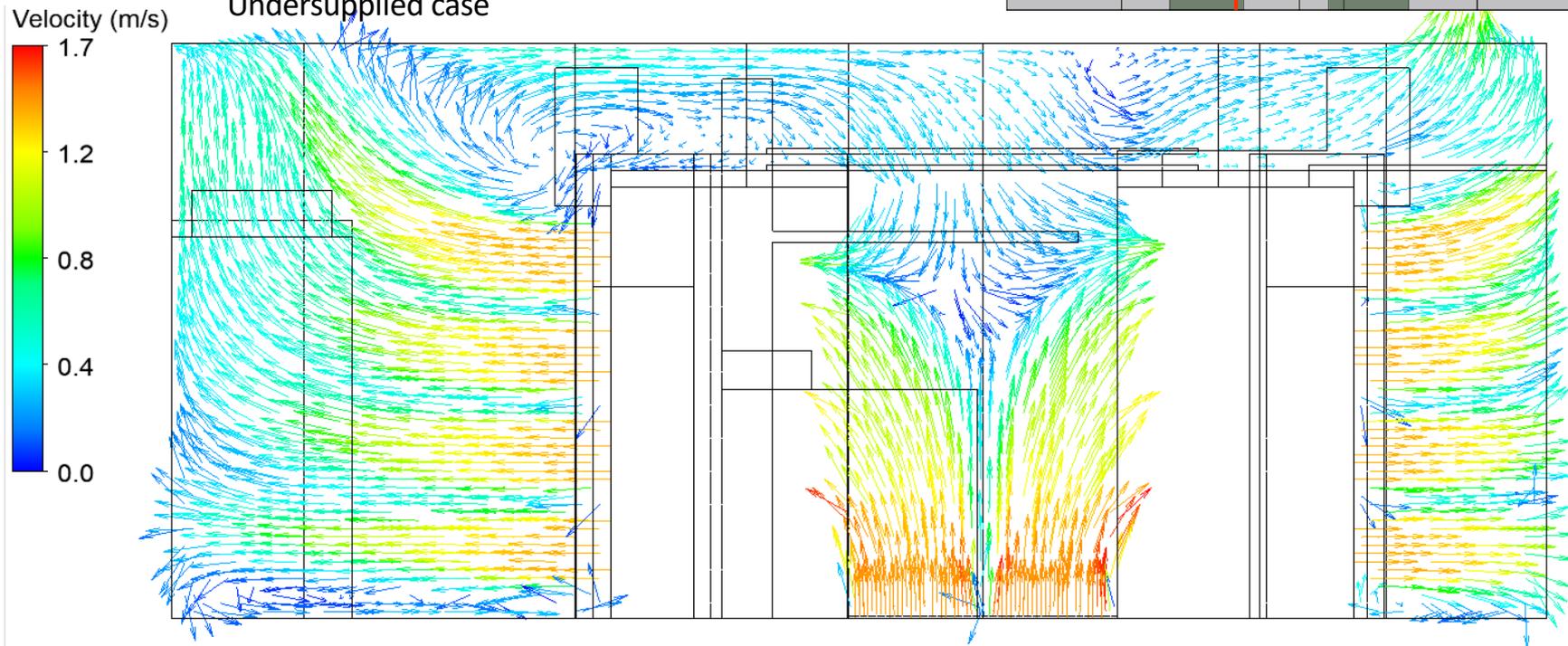
Velocity (m/s)



Flow patterns in a plane in front of Row A:
Undersupplied case



Airflow patterns in measurement plane C:
Undersupplied case



Thermal and velocity profile of CFD and experiment were compared and discrepancy was found. We are in the progress of studying the reason for the discrepancy.

Server flow rate is reduced 5 to 15% when running in the rack due to the external pressure drop. The result of an undersupplied case is more prone to the reduction of server flow rate.

The thermal profile of the CFD simulation is highly sensitive to the entrainment at the two ends of the cold aisle. It is suggested that the thermal profile of CFD simulation near the entrainment should be interpreted more cautiously.

Complete the result comparison of the baseline case, and minimize the discrepancy before the experiment is taken.

Complete all CFD simulations simultaneously with the experiment.

Complete writing of the report.

Thank You !

Study of the Level of Filtration Required to Maintain Reliable Operation of Information Technology Equipment in Data Centers Located in Coastal Regions with High Sea Salt Concentrations

- Roger Schmidt developed RTAR with Jensen Zhang with the hope to submit it by May deadline
- Intent was to gain TC 2.4 support
- For various reasons while TC 9.9 voted to submit not vote was received from TC 2.4
- Decisions to develop into Work Statement for subsequent submission to RAC

Study of the Level of Filtration Required to Maintain Reliable Operation of Information Technology Equipment in Data Centers Located in Coastal Regions with High Sea Salt Concentrations

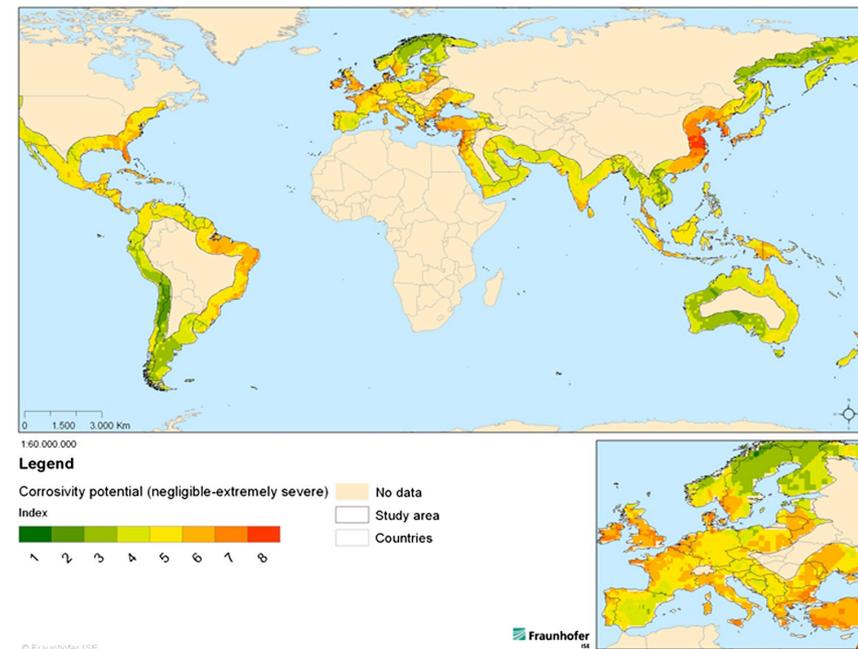
- ASHRAE's data center environmental guidelines extend the acceptable range up to 90% RH and 24°C dew point.
- Operating data centers at these high and/or variable levels, for example, when using free-cooling, can have detrimental effects on electronic equipment reliability if the environment has high levels of sea salt concentrations.
- This research program seeks to characterize the impact that high humidity combined with high sea salt concentrations representative of marine environments have on information technology equipment reliability.
- Guidelines will be prepared for the acceptable operating environment in data centers, which will increase the adoption of the ASHRAE Thermal Guidelines in data centers worldwide.

ASHRAE Research Proposal

Study of the Level of Filtration Required to Maintain Reliable Operation of IT Technology Equipment in Data Centers Located in Coastal Regions with High Sea Salt Concentrations

- No investigations have focused on the filtration required of sea salts such that corrosion or degradation of electronic equipment located in these coastal regions can be minimized.
- In addition, there is no investigation on the corrosion in marine environments of materials used in constructing IT equipment, principally copper, silver, and PCB's (printed circuit boards)
- This research aims to provide the proper filtration and to verify the current environmental guidelines for information technology equipment (ITE) in marine environments to maintain or expand the opportunity for increased free-cooling hours and improve data center energy efficiency globally.
- Draft Work Statement generated for possible submittal on Aug 15th

World's Coastal Regions rated by level of Corrosivity



Handbook

Bob McFarlane

International

Don Beaty

Welcome to the ASHRAE TC 9.9 Virtual Meeting!

We are on a break and will resume
at **11:30 am EDT**

Agenda

- Introduction and TC 9.9 Overview
- Programs, Research, Handbook
- Liaison Reports
- IT Subcommittee
- Conclusions



Housekeeping

Audio

- Attendees are muted upon entry
- Do not un-mute your line
- If you are joining via computer and phone line, ensure both are muted

Video

- We encourage you to keep your video off
- If you do enable your video, be mindful that you are on display! Turn off your video when needed.

Q&A

- Use the chat function to ask questions
- Our moderator will share questions throughout the presentation with the speaker to answer.
- If you need to speak, please use the Raise Hand button and the moderator will enable your microphone.

Attendance

- Please complete the attendance form found at the URL at the bottom of this slide

Recording

- This session will be recorded for the purpose of recording meeting minutes.



ASHRAE TC 9.9 Attendance Record

ASHRAE Technical Committee 9.9 - Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment
2020 Summer Meeting
Virtual Event Timing: July 13, 2020
Event Address: <https://zoom.us/j/98605846801?pwd=WXFoUjhLVXBWRUhhQczkyR0g5TndLZz09>
Contact us at tc99chair@gmail.com
Technical Committee Website: <http://tc0909.ashraetcs.org>

* Required

Name *

Your answer

Email

Your answer

Organization

Your answer

Attendance is being recorded using a Google Form. Please make sure you complete the form at:

<https://bit.ly/tc99-virtual-attendance>

90.1 Liaison Report

Rick Pavlak

90.4 Liaison Report

Dave Kelley

AHRI 1360 Liaison Report

Dave Kelley

SPC-127 Committee Updates to TC9.9

13 July 2020

**Method of Testing for Rating Air Conditioning Units
Serving Data Center (DC) and Other Information
Technology Equipment (ITE) Spaces**



Project Committee Update

- 3rd Review of SPC127-2012R
 - Independent Substantive Change Public Review
 - Comment Window 23 March 2020 through 11 May 2020
 - Closed with zero public comments
- Motion to Publish 9th of June 2020
 - Chair issued letter ballot 22 June 2020 Through 6 July 2020
 - Votes; (9) Yes, (0) No, (0) Abstain, (3) Ballots Not Returned
 - Motion to Publish Passed
- Publication submittal package to ASHRAE 7 July 2020

Committed Proposal Going Forward

- TC9.9 Sponsor an SSPC for 127 for Continued Maintenance.
 - There is an ongoing evolution of equipment and methods for cooling data centers
 - There are several needs identified in the 2nd Full Public Review that should be addressed as addendums
 - There is ongoing need to collaborate and align with AHRI 1360

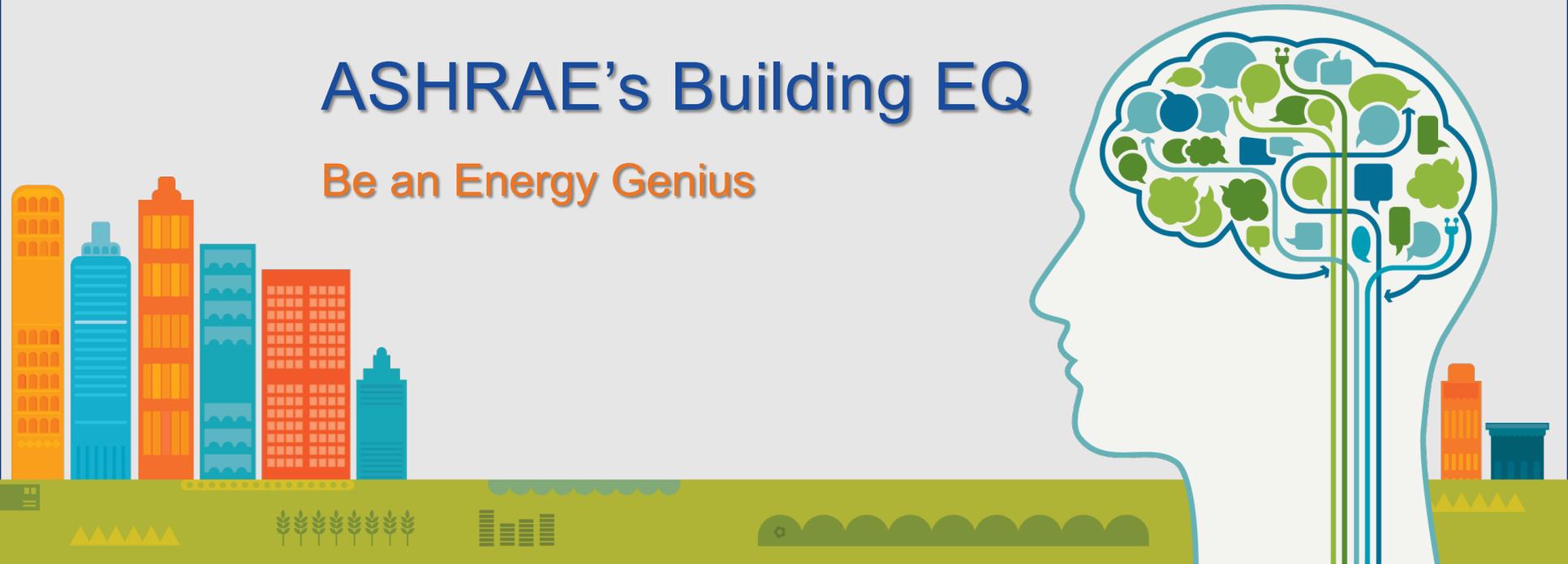
SSPC 300, Guideline 1.6

Terry Rodgers



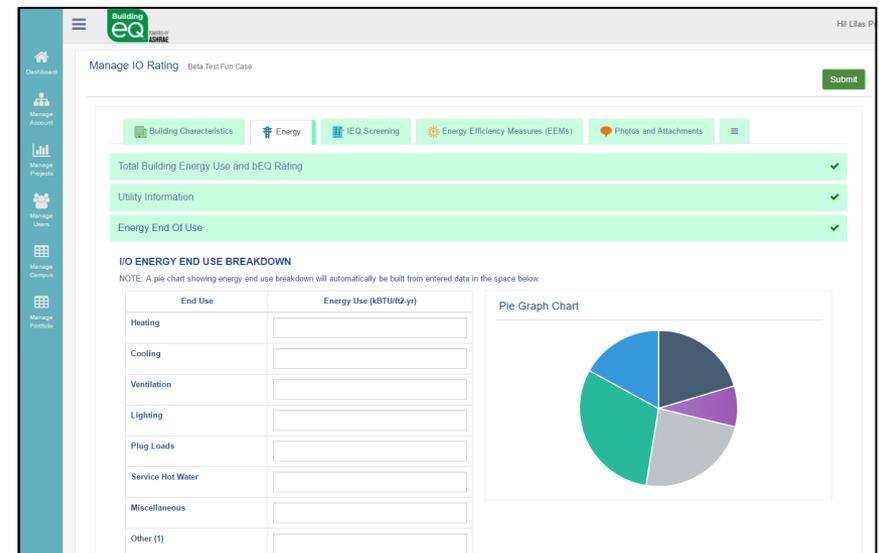
ASHRAE's Building EQ

Be an Energy Genius



What is Building EQ?

- Web based portal
- Benchmarks energy performance to similar buildings in same CZ
- Calculates building EUI
- Not an energy modeling tool
- Performs both *In Operation* and *As Designed* assessment



Manage IO Rating Beta Test Fun Case

Building Characteristics Energy IEQ Screening Energy Efficiency Measures (EEMs) Photos and Attachments

Total Building Energy Use and bEQ Rating ✓
Utility Information ✓
Energy End Of Use ✓

I/O ENERGY END USE BREAKDOWN
NOTE: A pie chart showing energy end use breakdown will automatically be built from entered data in the space below.

End Use	Energy Use (kBtu/yr)
Heating	
Cooling	
Ventilation	
Lighting	
Plug Loads	
Service Hot Water	
Miscellaneous	
Other (1)	

Pie Graph Chart




In Operation Assessment



- Uses metered energy bills for energy usage
- Reflects how the building is designed, used, and operated
- Most common application
- Rating from 0 (zero net energy) to 200 (energy inefficient)



In Operation Building Performance Score

$$(EUI_{\text{metered}} / EUI_{\text{baseline}}) \times 100$$

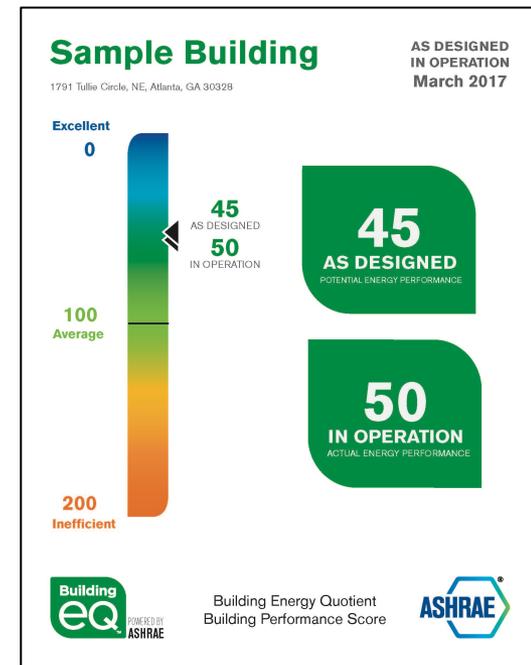
- Compares metered energy use of candidate building to baseline EUI
- Baseline EUI is based on CBECS median for the building type, corrected for location and hours of operation
- EIUs calculated for source energy using U.S. national site-to-source factors



As Designed Assessment



- Evaluates potential energy use
- Uses standardized energy model
- Independent of building occupancy and operating conditions
- Rating from 0 (zero net energy) to 200 (energy inefficient)



As Designed Building Performance Score

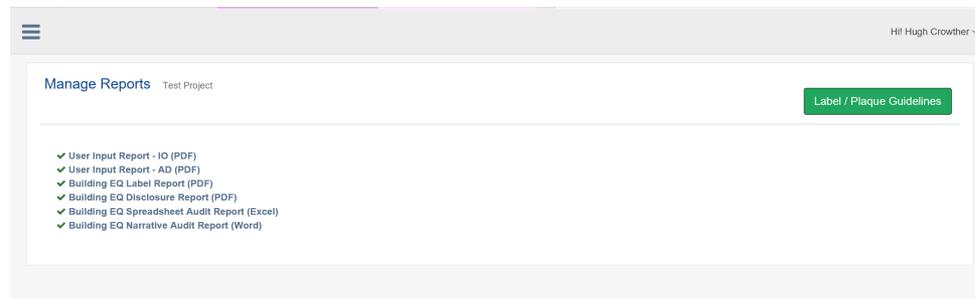
$$(EUI_{\text{simulated}} / EUI_{\text{baseline}}) \times 100$$

- Compares simulated energy use of candidate building to baseline EUI
- Baseline EUI is based on CBECS median for the building type, corrected for location
- Uses standardized modeling inputs of operating parameters (COMNET)
 - Occupancy, plug and process loads, schedules, setpoints
 - Depends on building and space type
- EUIs calculated for source energy using US national site-to-source factors



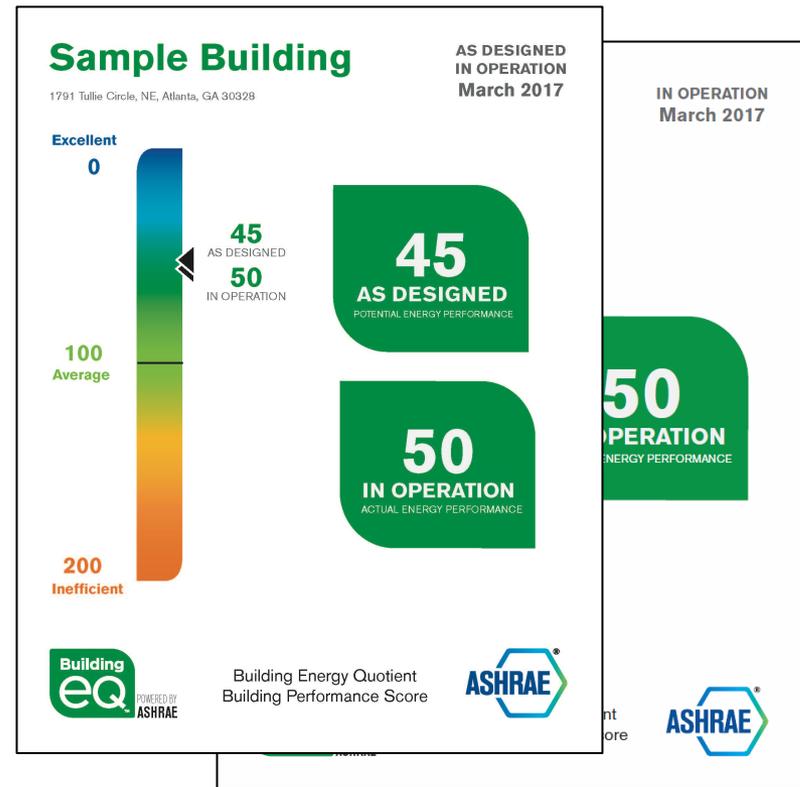
Building EQ Tour - Reports

- FREE** • User Input Report – PDF of Portal inputs
- FREE** • **Building EQ Label Report** – graphically shows your score
- \$50** • Disclosure Report – PDF of key energy performance data
- \$50** • Spreadsheet Audit Report (Excel) – Level 1 Energy Audit
- \$200** • Narrative Audit Report (Word) – Level 1 Energy Audit



Building EQ Label Report

- Visual indicator of Building EQ Performance Score on a barometer/scale
- **FREE** to credentialed user for approved submissions
- Buildings that like their score can get a plaque for display



Building EQ Performance Score

- Building Performance Score opens dialog on improving the building
- In Operation based on actual energy costs – Resonates with decision makers
- As Designed based on standardized model – Provides additional information for decision makers



Building EQ Credentialed Users

Official submissions require:

- PE licensed in the jurisdiction where project located
or
- ASHRAE Certified Provider
 - Building Energy Assessment Professional (BEAP) for the In Operation rating. www.ashrae.org/BEAP
 - Building Energy Modeling Professional (BEMP) for the As Designed Rating www.ashrae.org/BEMP



Summary: Building EQ

- Benchmarking, assessment, and asset rating tool that performs both In Operation and As Designed ratings
- Helps make bad buildings good and good buildings great
- Flexible for managing large portfolios of buildings and users
- Aligns with ASHRAE Standard 211 Level 1 Energy Audits
- Makes it easy to deliver both a benchmark and an energy audit
- Allows for consistent benchmarking and audit formats from a group of contractors



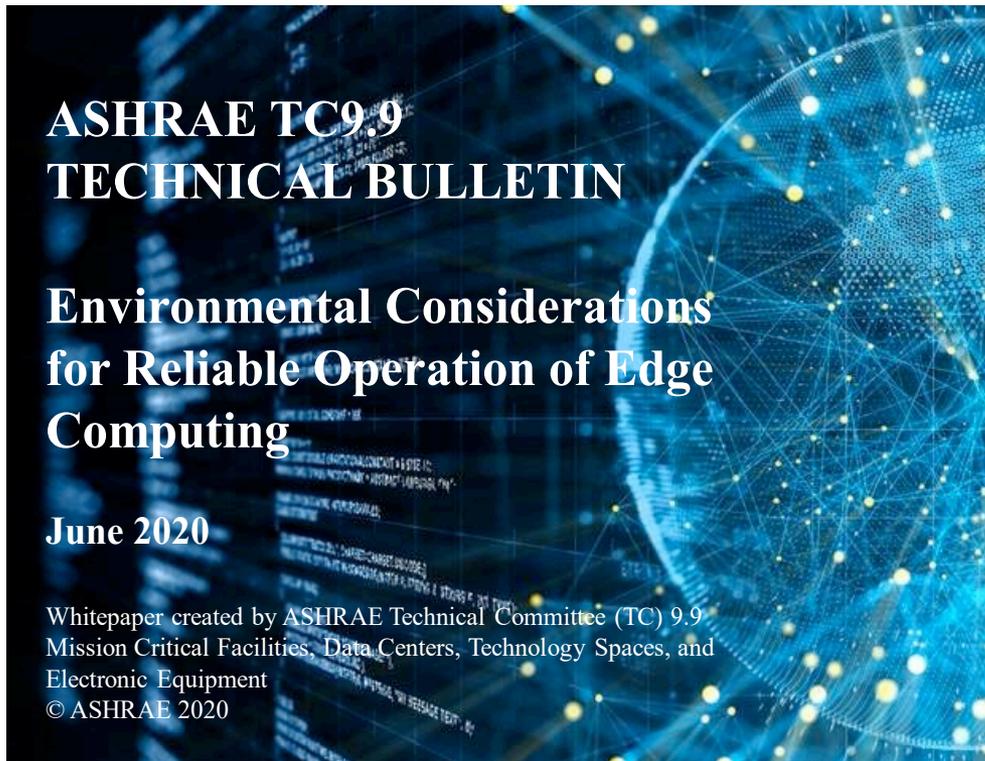
Check it out!

www.ashrae.org/BuildingEQ





Edge Computing Technical Bulletin



- **ASHRAE Edge Computing White Paper is in final formatting at DLB Associates**
- **Expect release in next couple of weeks**
- **Thank you authors (see list below) and voting members!!!**

Jon Fitch (Lead Author) – Dell EMC
Tozer Bandorawalla – Intel
Jason Matteson – Iceotope
Dustin Demetriou - IBM
Micah Sweeney– EPRI
Matthew Archibald – nVent
Tyler Duncan – Dell EMC
Trey Wiederhold – Dell EMC
Ty Schmitt – Dell EMC
Mark Bailey – Dell EMC
Shlomo Novotny - Consultant
Ben Coe – Skaska Consulting
Sama Aghniaey – Harris California - Harris Design Studio
Rajendera Kapoor – Star Consultants
Roger Schmidt – IBM

ASHRAE TC9.9 – July 13, 2020



New Form of TC9.9 Publication

- **Technical Bulletin is a new form of TC9.9 publication**
 - Intent is to message actionable information in a very timely manner
 - Elevate the profile and impact of TC9.9's messaging
- **Standard format is ~10 pages with actionable information bulletized in a summary section**
- **Propose ongoing publication of Technical Bulletins on ~6 month cadence on topics of highest industry interest**



Next Steps

- **Release to a broad distribution of media outlets, standards organizations, etc.**
 - Go big: see list of >40 media outlets, >10 standards organizations, >12 OEMs, and >6 container/enclosure suppliers
- **Track how many industry media outlets carry our Technical Bulletin**
 - Are they paying attention to TC9.9? Who is paying attention?
- **Track social media (Twitter, Facebook, other)**
 - How much social media discussion did we generate?
- **Monitor sales of Datacom books**
 - Did the Technical Bulletin help sell more Datacom books?
- **Review data and adjust our future Technical Bulletin strategy**



Thermal Guidelines for Data Processing Environments, 5th Edition

- Primary reason for this update was the completion of the ASHRAE-funded research project (1755-RP) on the effects of high relative humidity (RH) and gaseous pollutants on corrosion of IT equipment
- Major changes incorporated:
 - Copper and silver coupon testing strongly recommended twice yearly
 - Coupon testing resulting in less than 300A/200A – allows up to 70% RH
 - Coupon testing resulting in greater than 300A/200A – set below 60% RH as specified in the 4th edition of this book or below 50%
 - Added new high density air cooled class(H1) – allowable upper temperature limit set to 25C (class A1 – 32C); recommended upper temperature limit of 22 C(classes A1-A2; 27C)
- Other changes: Removed some duplicate reference materials that is already covered in the Liquid Cooling and IT Power Trends Datacom Books
- Several reviews and updates have been completed; voting members now have final draft for final review and vote
- Plan is for book to be in the bookstore by year-end

ASHRAE/IEC Collaboration

- The ASHRAE environmental envelopes appear to be in conflict with operating environments with more basic safety standards used to define cables, connectors, appliance couplers, receptacles, etc
- IEC/UL/CSA/NEMA Standards for plugs, connectors, wiring, cabling need to be consistent with requirements of maximum environmental conditions of IT equipment deployed in Data Centers
- Draft procedure prepared by the NEMA Ad Hoc chairman.
- Their draft procedure is intended for high ambient temperature environments starting at 50 C with increments at 5 C intervals (as example 60 C, 75 C , 90 C , 105 C) . Appropriate constructions for electrical components for the ambient conditions specified will be required especially at the highest temperatures.
- Proposed updates will be discussed via a call into the NEMA July 23rd meeting covering ASHRAE temperature requirements

Cold Weather Shipping White Paper

Joe Prisco



ASHRAE TC 9.9 Attendance Record

ASHRAE Technical Committee 9.9 - Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment
2020 Summer Meeting
Virtual Event Timing: July 13, 2020
Event Address: <https://zoom.us/j/98605846801?pwd=WXFoUjhLVXBWRUhhQmZkdzkyR0g5TndLZz09>
Contact us at tc99chair@gmail.com
Technical Committee Website: <http://tc0909.ashraetcs.org>

* Required

Name *

Your answer

Email

Your answer

Organization

Your answer

Attendance is being recorded using a Google Form. Please make sure you complete the form at:

<https://bit.ly/tc99-virtual-attendance>

Thank You

TC 9.9 Website:
tc0909.ashraetcs.org