Welcome!

Welcome to the ASHRAE TC 9.9 Virtual Meeting!

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

Agenda

- Introduction and TC 9.9 Overview
- Program
- Webmaster
- Liaison Reports
- COVID-19
- International
- Industry Engagement
- Publications
- IT Subcommittee

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

Attendance: http://bit.ly/tc99-attendance

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

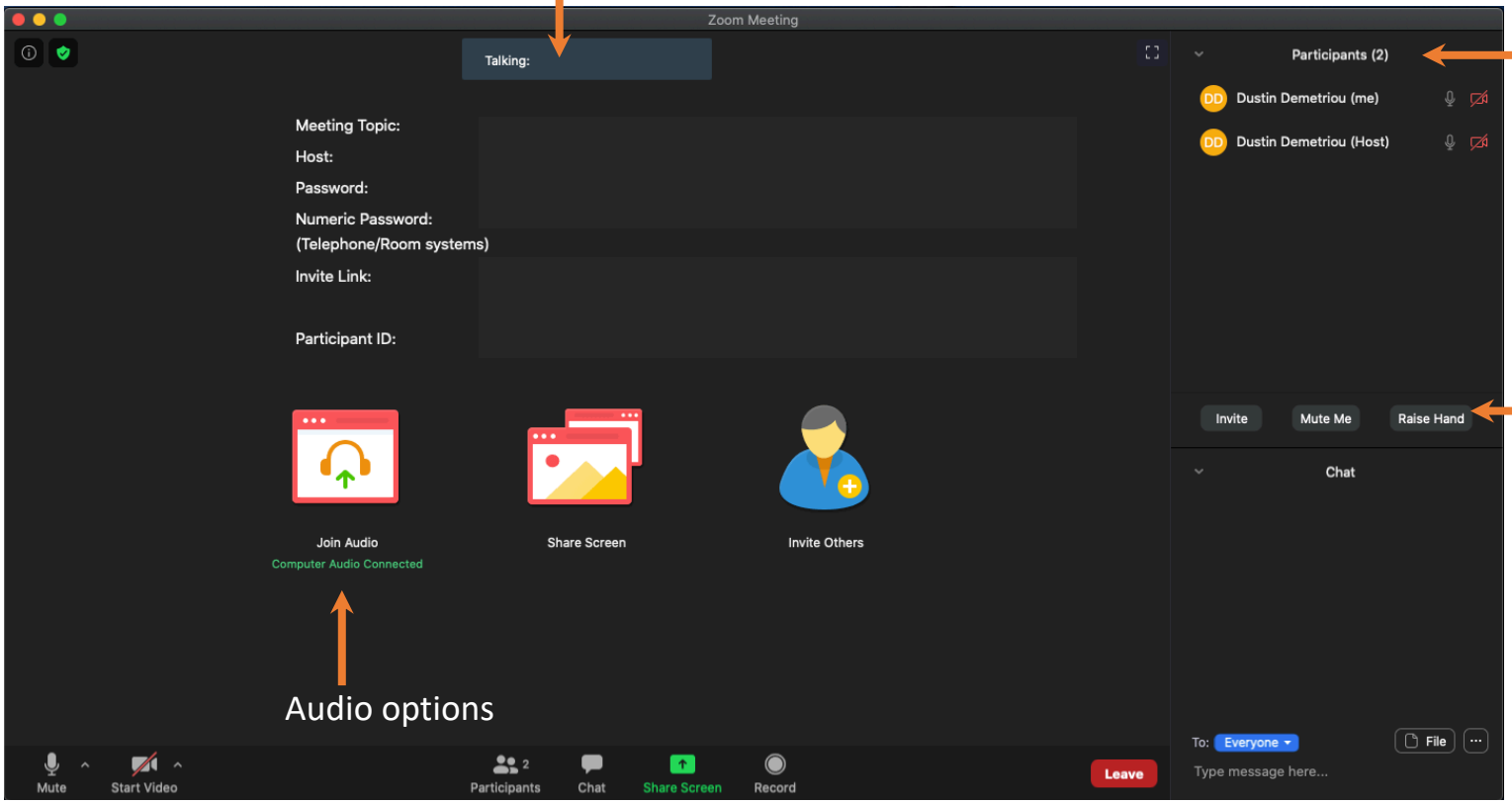
ASHRAE Winter Conference 2021

Virtual

Zoom Controls

Full Zoom Window

Speaker



Participant panel

Raise hand

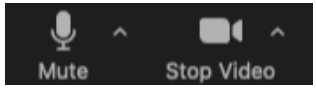
Chat panel

Audio options

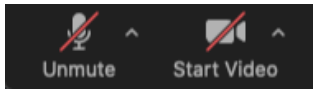
Toggle chat panel on/off

Turn video on / off

Mute / unmute audio

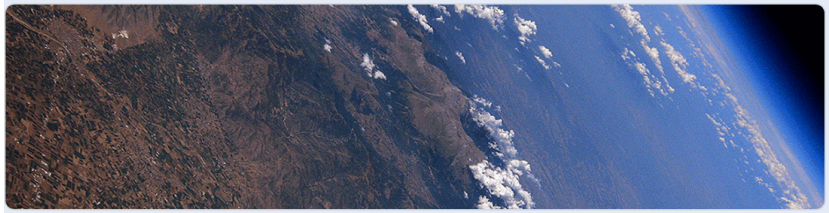


Audio and Video ON



Audio and Video OFF

Attendance



ASHRAE TC 9.9 Attendance Record

ASHRAE Technical Committee 9.9 - Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment
2021 Winter Meeting
Virtual Event Timing: January 19, 2021
Event Address: https://ashrae-org.zoom.us/j/98449509730?pwd=Q2ZCNFhRQXFTY05CSTNYbElZTkdKQT09
Contact us at tc99chair@gmail.com
Technical Committee Website: http://tc0909.ashraetcs.org

* Required

Name *

Your answer

Email

Your answer

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ASHRAE Code of Ethics

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.

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Agenda

Tuesday, January 19, 2021
TC 9.9 Main Meeting
10:00 AM – 2:00 PM EST
Location: Virtual

Topic		Time	Presenter
Introduction	Welcome and Introductions	5	
	What is TC 9.9 Presentation	15	Dustin Demetriou
	TC 9.9 Officers and Membership	10	
Program		5	Nick Gangemi
Webmaster		5	Ecton English
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
	MTG.CYB	10	Ecton English
	COVID-19 Impact on the Data Center Industry	20	John Groenewold
Break		15	
International	International Update	10	Don Beaty
	Dubai Data Center Course	10	Demetriou / Seymour
Industry Engagement	LBNL / DOE	10	Steve Greenberg
	OCP Liquid Cooling Workgroup	10	Nigel Gore
Publications	Edge Technical Bulletin	5	Jon Fitch
	Technical Bulletin Strategy	10	Jon Fitch
	Cold Weather Shipping White Paper	5	Joe Prisco
	Thermal Guidelines 5th Edition	15	R. Schmidt
IT Subcommittee	Hot Aisle Considerations for Human Health	10	John Gross
	Water Cooling White Paper	15	Dave Moss
	IEC Connector Harmonization	5	Roger Schmidt

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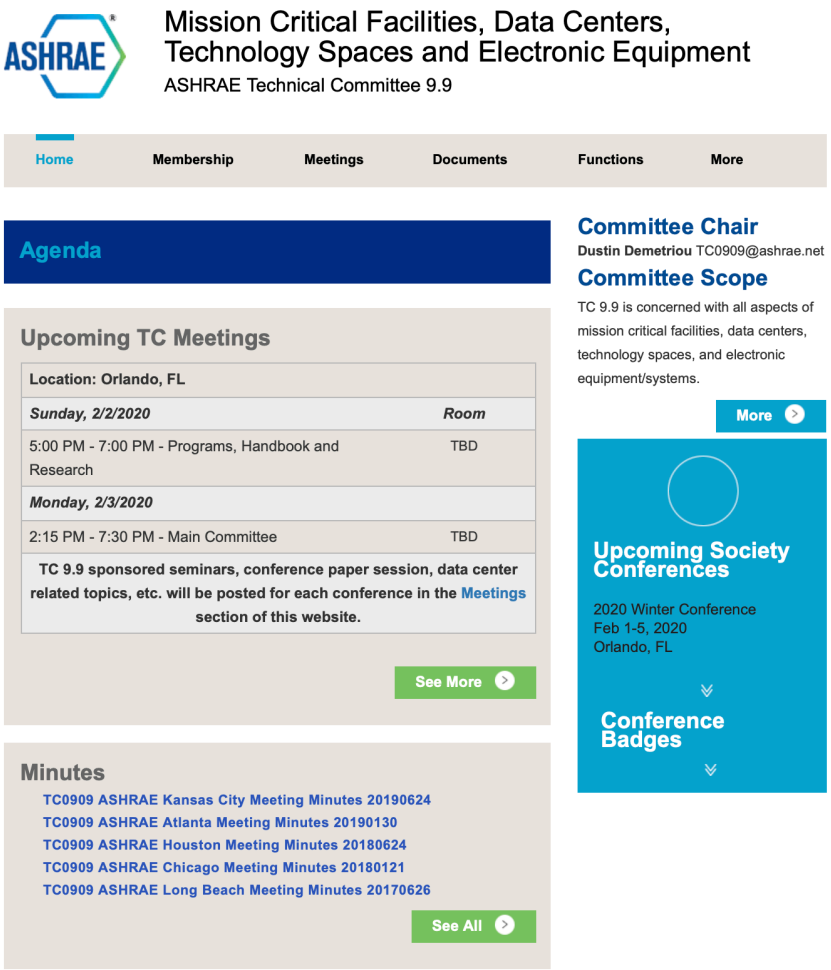
TC 9.9 Webpage



http://tc0909.ashraetcs.org

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ASHRAE TC 9.9 Overview

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

ASHRAE TC 9.9 Membership

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

ASHRAE TC 9.9 Contributions

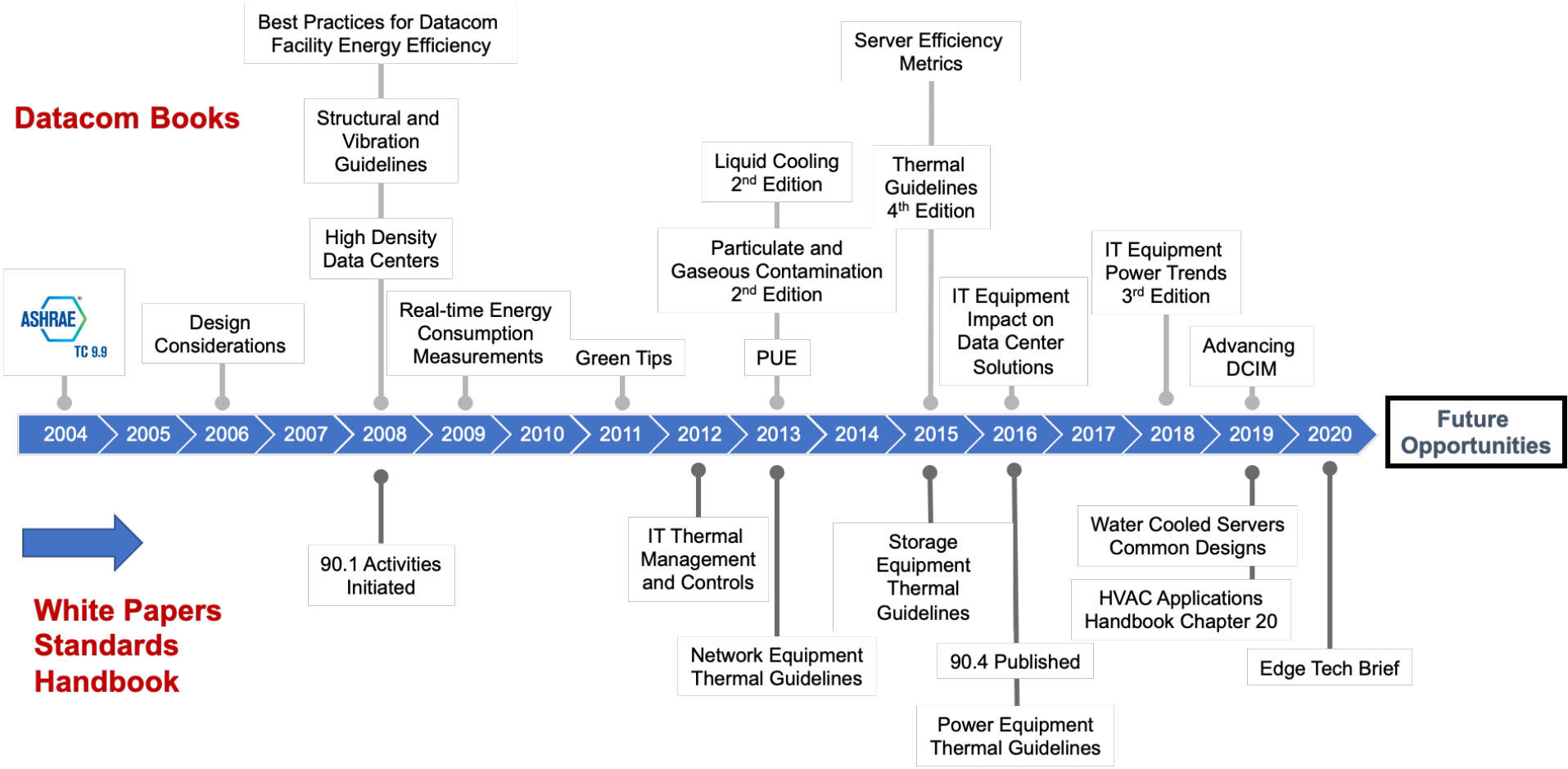
Industry Volunteers Provide the Expertise

- 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

Timeline of ASHRAE TC 9.9 Published Results



TC 9.9 Datacom Book Series

Essentials of Data Center Design

- Establish a Baseline
- Target Forecasts and Trends
- Engage in Best Practices
- Prepare for Special Cases
- Measure Key Metrics

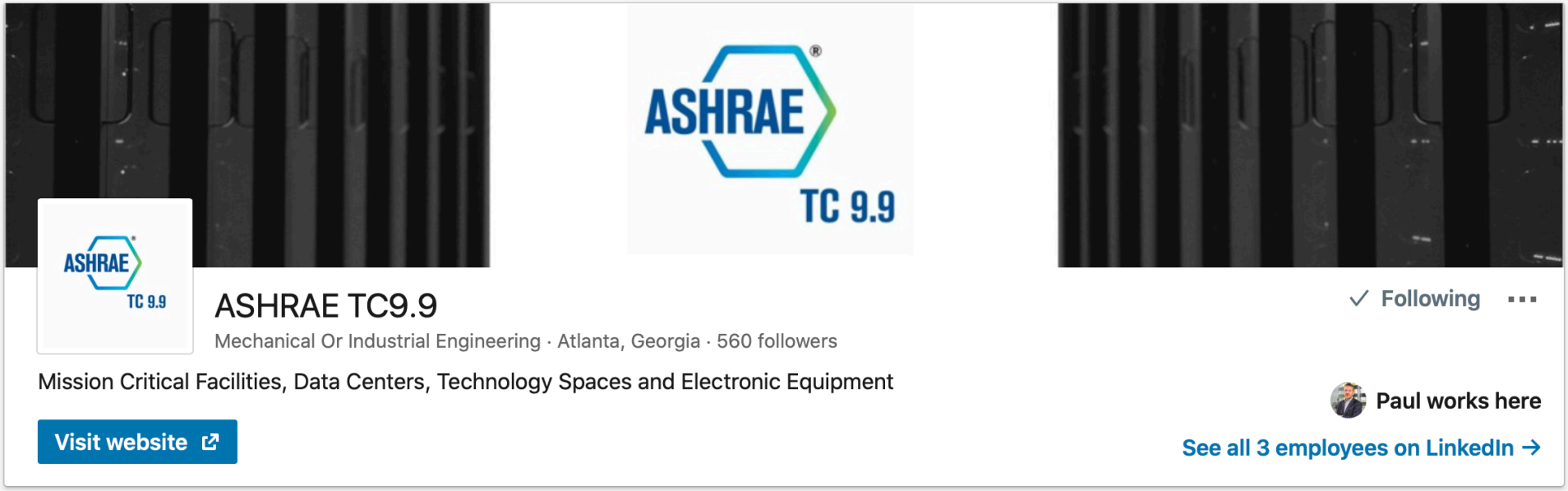
Current TC 9.9 Work Activities

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

TC 9.9 LinkedIn Page



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

ASHRAE TC 9.9 Officers & Membership
August 1, 2020 – June 30, 2021

TC 9.9 Officers

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

Attendance: http://bit.ly/tc99-attendance

TC 9.9 Liaisons

- Standard 90.1: Rick Pavlak
- Standard 90.4: Dave Kelley
- Standard 127: John Bean
- Standard 300, Guideline 1.6: Terry Rodgers
- International: Don Beaty
- MTG.CYB: Ecton English

Voting Members

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, Microsoft

Attendance: http://bit.ly/tc99-attendance

Voting Members Rolling Off in 2021

1. Dustin Demetriou, IBM

2020 Votes

Vote	Date	Approved
Sea Salt RTAR	April	Yes
Edge White Paper	May	Yes
Orlando Meeting Minutes	June	Yes
Thermal Guidelines 5th Edition	July	Yes
Sea Salt WS	August	Yes
Acclimation White Paper	September	Yes
Thermal Guidelines Liquid Cooling Classes	November	Yes
Summer Virtual Meeting Minutes	December	Yes

Attendance: http://bit.ly/tc99-attendance

Membership Information

Provisional Corresponding Members (68 as of 1/2021)

- 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 (342 as of 1/2021)

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

Keep Your ASHRAE Profile Updated!

Join TC 9.9

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

Functional Group Evaluation Sheet

TC9.9		**FG (i.e. TC5.2)**
Dustin Demetriou		**FG Chair**
Winter 2021		**Meeting**
Directions:		
	In column "B", using the drop-down menu, insert yes, no, or "n/a" for not applicable (except Section E which requires a numerical number)	
	In column "A", using drop-down selection, as a total subjective review, with "GREEN" meeting most (75% or more) of the requirements, "YELLOW" meeting approximately 50% of the requirements, and "RED" meeting less than 25% of the requirements.	
	A. Functional Rquirements	
	B. Leadership	
	C. Membership	
	D. Objectives (Success with meeting objectives as determined by the committee--refer to TC MOP 5.1)	
	E. Work Product (Research + Programs) [Insert best guess for the number research or programs that occurred]	
	F. Activity Form	
	H. Overall Rating	Overall, **in the opinion of the section head**, how would you rate the FG?
		RED = Not functional to the point of not contributing to ASHRAE and/or the industry relevant to the FG's title, purpose, scope, leading to dissolution of the FG, merger with another FG, or absorption by an existing FG
		YELLOW = At least minimally functional with few to several concerns for the future of the FG's operation
		GREEN = At least adequately functional with very few concerns for the future of the FG's operation
continue	**I. Recommendations**	Continuing, merging, disbanding, or alter scope

TC Reorganization Update

TAC has a subcommittee to implement recommendations of TC Re-Org Ad Hoc final report.

- So far, TAC has approved 5 TC mergers – 3.2 & 3.3, 8.10 & 8.12, 9.4 & 9.8, 7.3 & 7.8, and 10.1 & 10.3. More are in the works.

Awards

2021-2022 Hightower Award Nominations by Wednesday, September 1st

TAC wishes to encourage TCs to make nominations for the 2020-2021 *George B. Hightower Technical Achievement Award.* Nominations are due to Section Heads by September 1, 2021 or sooner.

The award recognizes outstanding technical leadership and contributions on a TC/TG/TRG during the past four years, excluding research and standards activities. Please go to the Technical Committee page of the ASHRAE website at the following link under the “Procedures, Forms…” heading: www.ashrae.org/tcs.

https://www.ashrae.org/membership/honors-and-awards

Additional Announcements

CEC's Standing Request for Future Society Meeting Program Track Suggestions

The Conferences and Expositions Committee (CEC) oversees ASHRAE's annual and winter conferences and other specialty conferences and expositions globally. The CEC continually works to improve the conference experience for all attendees. To help keep a "pulse" on the technical issues facing professionals in the HVAC&R marketplace, and to create meetings that reach all of ASHRAE's constituencies, the CEC seeks ideas for tracks for the Chicago 2021 Winter meeting and annual and winter conferences beyond as well as topics for specialty conferences from TC members.

The Professional Development Committee (PDC) is seeking ideas for new ASHRAE Learning Institute (ALI) courses.

The Professional Development Committee (PDC) is actively seeking ideas for new ASHRAE Learning Institute (ALI) courses. We need practical courses of broad interest to be presented as face-to-face seminars or short courses, instructor-led online courses and self-paced courses. Examples include courses with a focus on new technologies that need to be shared, fundamentals for engineers new to the discipline, standard applications that need explanation, and courses based on new design guides. Does your TC have a potential course idea?

Thank You

TC 9.9 Website

tc0909.ashraetcs.org

Programs Update

ASHRAE Virtual Winter Meeting

Nick Gangemi, Program Chair

2021 ASHRAE Annual Conference
Phoenix, AZ | Jun 26–30, 2021

The 2021 ASHRAE Annual Conference will be held in Phoenix, AZ!

Phoenix Tracks

Track 1: Fundamentals and Applications

Chair: Sonya Pouncy, sonyapouncy@gmail.com

Fundamentals are the foundation for understanding applications in engineering. Key components of ASHRAE fundamentals include thermodynamics, psychometrics, fluid and mass flow. This track provides opportunities for papers and presentations of varying levels across a large topic base. Concepts, design elements and shared experiences for theoretical and applied concepts of HVAC&R design are included.

Track 2: HVAC&R Systems and Equipment

Chair: Rupesh Iyengar, rupesh_iyengar@yahoo.com

HVAC&R Systems and Equipment are constantly evolving to address the changing requirements of the built environment. Papers and programs in this track will focus on the development of new systems and equipment, improvements to existing systems and equipment and the proper application and operation of systems and equipment.

Track 3: Research Summit

Chair: Kristen Cetin, cetinkri@msu.edu

Active research, and the exchange of those research findings, are critical to the development of our HVAC&R industry and built environment. The 8th annual research summit invites researchers to share those results, including ASHRAE-sponsored research and research of interest to the ASHRAE community. Researchers are invited to present papers, extended abstracts, seminars, forums or participate in panel discussions. The Research Summit includes a partnership with ASHRAE's archival journal, Science and Technology for the Built Environment.

Phoenix Tracks

Track 4: Professional Development

Chair: Marites Calad, mcalad@norman-wright.com

As members of a professional organization, we not only participate for the great value of technical exchange, but also the interpersonal exchange. We recognize that the single greatest strength of our organization is its membership. This track is designed to allow those professionals an opportunity to develop in the areas of presentation skills, leadership, team-building, understanding various business operations, interpersonal skills, etc. In short, the Professional Development Track will cover all aspects of business outside of engineering/technical applications and lends itself to interactive session types such as workshops and forums.

Track 5: Design, Control, and Operation of Critical Environments

Chair: Raul Simonetti, raul.simonetti@carel.com

Critical environments often present design, control, and operation challenges that require innovation, attention to detail, and a thorough understanding of the intended operational parameters. This track includes innovative designs and strategies that adapt to the standards and special requirements presented by healthcare, cleanrooms, data centers, laboratories, isolation rooms, and pharmacies. Papers and presentations will also address how controls systems, smart building technologies, and security systems and other technologies are adapting to the emerging needs of critical environments.

Track 6: HVAC&R for Indoor Plants & Animals

Chair: Ryan MacGillvray, ryan.macgillivray@dwel.com

This track addresses HVAC&R systems design for controlled environments that host plants & animals. Papers and programs in this track will present the challenges and opportunities associated with energy and water utilization for indoor growing spaces, including standards and regulations that guide the design of plant & animal habitats. Environmental parameters for indoor agriculture, including controlling temperature, humidity, air movement, air quality will be covered. This track will also address reducing consumption of energy & water and compare how crop types and animal species impact HVAC analysis and design.

Phoenix Tracks

Track 7: Future Proofing - Renewable, Regenerative, and Resilient

Chair: Andy Cochrane, acochrane@industrialairinc.com

The HVAC&R industry faces many challenges including climate change, pandemics, natural disasters, catastrophic accidents, and terrorism. Rising to meet these challenges are a host of technologies and strategies, including grid-enabled buildings, demand response, decarbonization, resiliency, zero energy design, energy-efficiency and renewable energy systems. This track invites papers, abstracts, seminars and forums that highlight the innovative technologies and strategies that are reimagining our relationship with the built environment now and into the future.

Track 8: Hot, Hot, Hot

Chair: Nohad Boudani, nohadb@inco.com.lb

The world is warming. The built environment faces increased challenges to meet the demand for comfortable Indoor and outdoor environments in warmer climates. This track is for papers and presentations that address humidity control, outdoor cooling, passive cooling, water scarcity considerations, other design opportunities, and innovative technologies that help HVAC&R professionals adapt to the hottest climate trends.

Track 9: To be Announced

Important Dates for Phoenix

Web Site Open for Extended Abstracts and Program Proposal Submittals

- The 2021 ASHRAE Annual Conference is now accepting Extended Abstract papers and program proposals.
- Extended Abstracts are being accepted for the Research Summit track only. Extended Abstracts can be up to 3 pages in length and must be prepared using the Word template. **Extended Abstracts are due February 15, 2021.**
- **Proposals for Seminars, Forums, Workshops, Panels and Debates are being accepted through February 18, 2021.**

For more information or to submit an Extended Abstract or a program proposal, click here https://ashraem.confex.com/ashraem/s21/cfp.cgi

Important Dates for Phoenix

Wednesday January 13, 2021: Revised Conference Papers/Final Technical Papers Due
Monday February 15, 2021: Extended Abstracts Due
Thursday February 18, 2021: Conference and Technical Paper Final Accept/Reject Notifications
Monday February 22, 2021: Program Submissions Due
Friday March 19, 2021: Extended Abstract Accept/Reject Notifications
Friday April 2, 2021: Program Submissions Accept/Reject Notifications

Nick Gangemi, Program Chair

585-721-8795

Nick.GANGEMI@bureauveritas.com

Webmaster

Ecton English

90.1 Liaison Report

Rick Pavlak

90.4 Liaison Report

Dave Kelley

AHRI 1360 Liaison Report

Dave Kelley

SSPC 127

John Bean

Summary of SPC 127

- The 2020 version of standard was published towards the end of last year and should be available on Standards website.
- We have been approved to start continuous maintenance and interested people may apply online for membership. Application window will close in April.
- Anticipate new SSPC127 to be operational by late June of this years
- It is reasonable to expect first actions of SSPC to revisit some of the comments from last full public review and craft possible addendum to address differed concerns.

Preview

ASHRAE 127-2020

Most Recent

Track It

Standard 127-2020 -- Method of Testing for Rating Air-Conditioning Units Serving Data Center (DC) and Other Information Technology Equipment (ITE) Spaces (ANSI Approved)

STANDARD by ASHRAE, 2020

View all product details

Language: English

Available Formats	Options	Availability	Priced From (in USD)	
PDF		Immediate download	**$71.00**	Add to Cart
Printed Edition		Ships in 1-2 business days	**$71.00**	Add to Cart
Printed Edition + PDF		Immediate download	**$103.00**	Add to Cart

https://www.techstreet.com/standards/ashrae-127-2020?product_id=2202074

SSPC 300, Guideline 1.6

Terry Rodgers

MTG.CYB

Ecton English

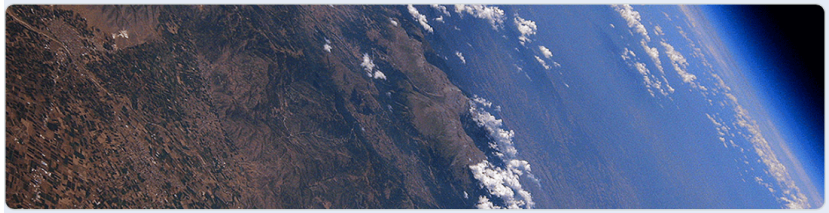
COVID-19 Impact on the Data Center

John Groenewold

COVID Impact on Mission Critical Operations Discussion

- Procurement of Supplies
- COVID Testing
- Tiger Teams
- PPE Precautions
- Conflict between Facility and IT Operations Policies
- Increased Deferred Maintenance
- Increased Time between Preventative Maintenance Activities and Impact on Reliability and Site Availability
- Travel between Sites / Sharing Personnel
- Construction Separation
- Electro-static spraying
- Material Deliveries
- 3rd Party Maintenance Support & Restricted Site Visits
- Vendor Team Social Mixing
- Geographic Travel Restrictions

Attendance



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* Required

Name *

Your answer

Email

Your answer

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We are on a break and will resume at 11:40 am EDT

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- Webmaster
- Liaison Reports
- COVID-19
- International
- Industry Engagement
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InternationI

Don Beaty

Designing & Operating Data Centers for the Internet of Everything: Mitigating Risk and Optimizing Performance

Dustin Demetriou, Mark Seymour

Course Content

- PART 1—Technology; Load Growth; Macro / Micro; ASHRAE and TC 9.9
- PART 2—IT Hardware Design; ASHRAE Thermal Guidelines; Hardware Trends
- PART 3—Datacom Facilities; Air Cooling; Liquid Cooling; Commissioning
- PART 4—Metrics and Evaluation of Data Center Facility Efficiency
- PART 5—Data Center Infrastructure Management
- PART 6—Facility Case Study; Ongoing TC9.9 Activities; Conclusions

Attendees

- Primary Job Function
  - Consulting
  - Contractor Installer
  - Design Engineer
  - Educator / Research
  - Facilities Engineer Manager
  - Energy Conservation
  - Government
  - Manufacturer
  - Sales Engineer
- Principal Activity of your Firm
  - Consulting (engineering or Architectural)
  - Contracting / Design Build
  - Building Owner & Facility Management
  - Manufacturing
  - Manufacturing Representative
  - Healthcare
- Reason for Registering
  - Knowledge / CEUs
  - New job or job requirements
  - New to HVAC&R Industry
  - Contractor Installer
  - Recent university graduate

Feedback

- Overall, all attendees rated the course highly (Strongly Agree or Agree)
- More location specific guidance
- Heat load calculations for data centers
- Redundancy, availability, reliability
- A lot of focus on IT. Additional focus needed on facility design
- More case studies
- In depth courses of data center HVAC and Electrical design
- Sustainability design guidance for data centers

Attendees

- Primary Job Function
  - Consulting
  - Contractor Installer
  - Design Engineer
  - Educator / Research
  - Facilities Engineer Manager
  - Energy Conservation
  - Government
  - Manufacturer
  - Sales Engineer
- Principal Activity of your Firm
  - Consulting (engineering or Architectural)
  - Contracting / Design Build
  - Building Owner & Facility Management
  - Manufacturing
  - Manufacturing Representative
  - Healthcare
- Reason for Registering
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BERKELEY LAB

LAWRENCE BERKELEY NATIONAL LABORATORY

U.S. DEPARTMENT OF ENERGY

Center of Expertise for Energy Efficiency in Data Centers (CoE)

datacenters.lbl.gov

Steve Greenberg, PE

January 19, 2021

ASHRAE TC 9.9

Activities Update

- Recent and near-term webinars include:
  - **Data Center Toolkit Webinar Series:** A four-part webinar series introduces version 2.0 of our highly used **Data Center Energy Efficiency Toolkit**.
    - **The New IT Equipment Tool: Saving Energy At The IT Equipment Level: (Webinar 4)**
      - Thursday, January 21st | 2:00-3:30 EST | **Register now !**
    - **Toolkit Webinar Series: Air Management (Webinar 3)**
      - October 2020 | Slide deck
    - **An Electric Power Chain Tool for Data Centers (Webinar 2)**
      - September 2020 | Slide deck
    - **A Suite of Energy Assessment Tools (Webinar 1)**
      - August 2020 | Webinar Recording | Slide Deck
  - **Everyone has a Data Center: How to be an Energy Champion for Yours**
    - Held in July 2020 | Webinar Recording | Slide Deck
  - **Opportunities for ESPCs in Data Centers**
    - Held in May 2020 | Webinar Recording | Slide Deck
- Data Center Energy Practitioner (DCEP)
  - Upcoming virtual trainings in February & March
  - Visit datacenters.lbl.gov/dcep for training
- Support for the Office of Management and Budget's Data Center Optimization Initiative (ongoing, federal)

New & Updated Resources

- **New Resources:**
  - Guide for Quickly Estimating Air Management Energy Savings in Small Data Centers: Air Management Look-up Tables
  - IT Equipment Energy Assessment Tool
  - Electrical Power Chain Tool
  - Thermal Guidelines and Temperature Measurements in Data Centers
  - Building the Business Case for Energy Efficiency in Data Centers

- **Updated Resources:** Data Center Energy Efficiency Toolkit
  - Energy Assessment Workbook
  - Updated Energy Assessment Process Manual

- **Upgraded CoE site launching in Winter 2021**

- **Stay up to date with the latest CoE developments!**
  - Quarterly CoE newsletter with announcements on upcoming webinars, tools, and more. Email us at CoE@lbl.gov to subscribe or fill out our interest form.
  - Follow us on Twitter @DataCenterCoE

For More Information

- Email: segreenberg@lbl.gov OR CoE@lbl.gov
- CoE (Resources, News and Training, etc.): datacenters.lbl.gov
- Follow us on Twitter @DataCenterCoE
- Liquid Cooling:

  datacenters.lbl.gov/technologies/liquid-cooling
- Small data centers:

  datacenters.lbl.gov/small-data-centers
- DCEP: datacenters.lbl.gov/dcep

datacenters.lbl.gov

U.S. DEPARTMENT OF
ENERGY

UNIVERSITY OF
CALIFORNIA

Open Compute Project Update

ASHRAE TC 9.9 Winter Conference

19 January 2021

Nigel Gore- Vertiv

OPEN Compute Project®

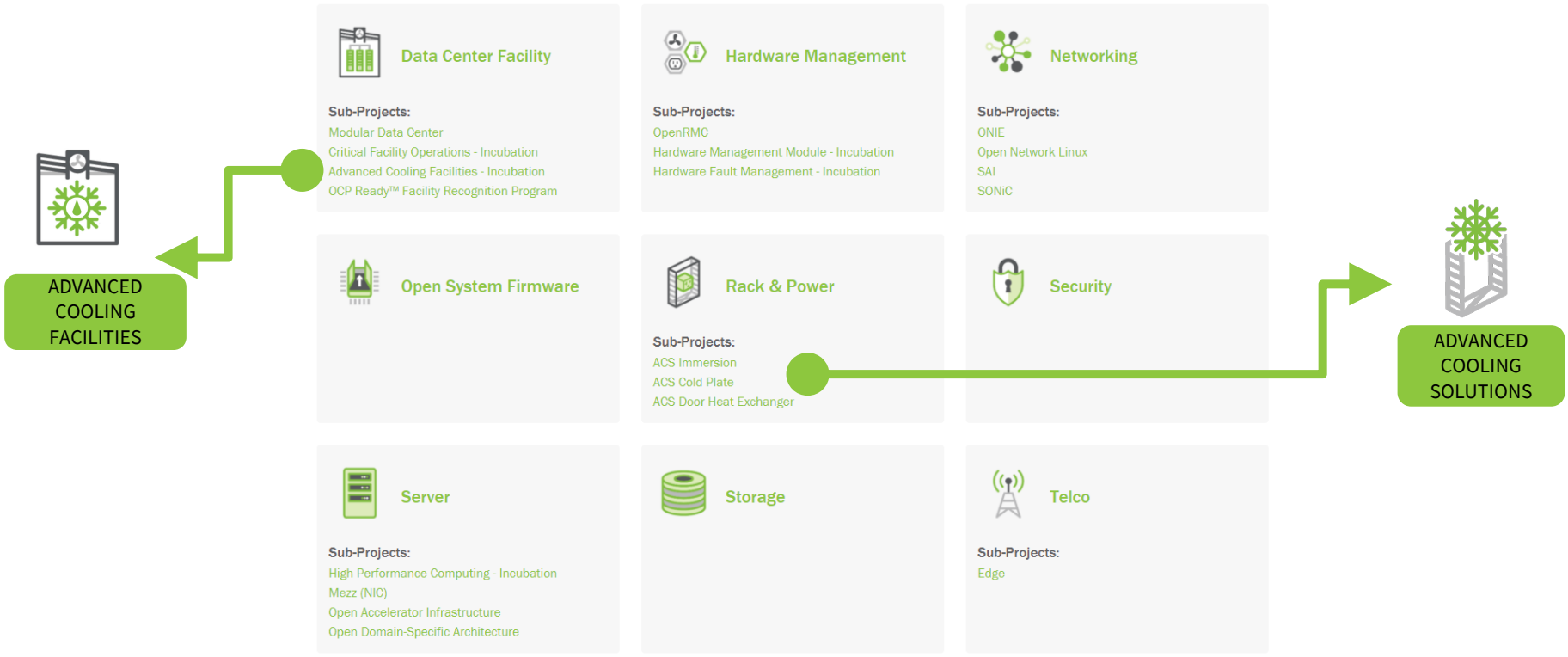
What is the Open Compute Project (OCP)?

- Industry non-profit focused on establishing an open source HW ecosystem for the Data Center market
- Founded in 2011 by Facebook, Rackspace, Intel - now 200+ members and growing
- Current board member companies are Facebook, Rackspace, Intel, Microsoft, Goldman Sachs
- Community of members contribute specifications, guidelines and products

OPEN Compute Project®

https://www.opencompute.org/

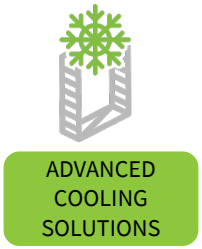
Open Compute Project – Structure



OPEN Compute Project®

https://www.opencompute.org/

Advanced Cooling Solutions charter



Enable global adoption of liquid cooling for data center equipment

Project activities:

- Create specifications
- Create standards
- Create support documentation
- Create reference designs
- Harmonization of liquid cooling solutions

Project focus:

- Standardization and definition of critical interfaces
- Standardization of operational parameters
- Standardization of environmental conditions

Door HX Sub-Project Overview

In-scope activities

- Design specific to Open Rack only
- Physical & Interfaces specification, serviceability, regulations
- Operating conditions and Quality/Reliability
- Metrology of heat extraction performance
- Definition of different solutions (in Facility Water ready DC or in Air-ready DC)

What's happening?

- *OCP incubation committee approval on Approval process for* ACS Door HX Specification.

Cold Plate Sub-Project Overview

Objective: Generate an open specification and supporting documents focusing on standardization and definitions of liquid cooled solutions and interfaces without preventing innovation

Approved contributions:

- 2019: ACS Cold Plate Requirements
- 2020: Manual Couplings and Hoses Best Practices whitepaper

Contributions under Consideration:

- 2020: Universal Quick Disconnect (UQD) Specification – By Intel

Current projects:

- Leak Detection and Mitigation: Whitepaper
- Blind Mate Interfaces Group

Immersion Sub-Project Overview

Approved contributions:

- 2019: OCP “Immersion Requirements” spec
- 2019: FAN SIM spec
- 2020: Open Cassette spec
- 2020: OCP whitepaper “Design Guidelines for Immersion Optimized IT Equipment”

Current projects:

- Material & Liquid compatibility: Whitepaper/database
- Immersion Requirements rev2: Whitepaper and spec

Advanced Cooling Facility Charter

The Advanced Cooling – Facilities Sub-Project collaborates on integration of Advanced Cooling Solutions (ACS) into Data Center Facilities via liquid distribution.

Participants develop solutions, guidance and reference designs that enable ACS deployment in both new and existing data centers

Current projects:

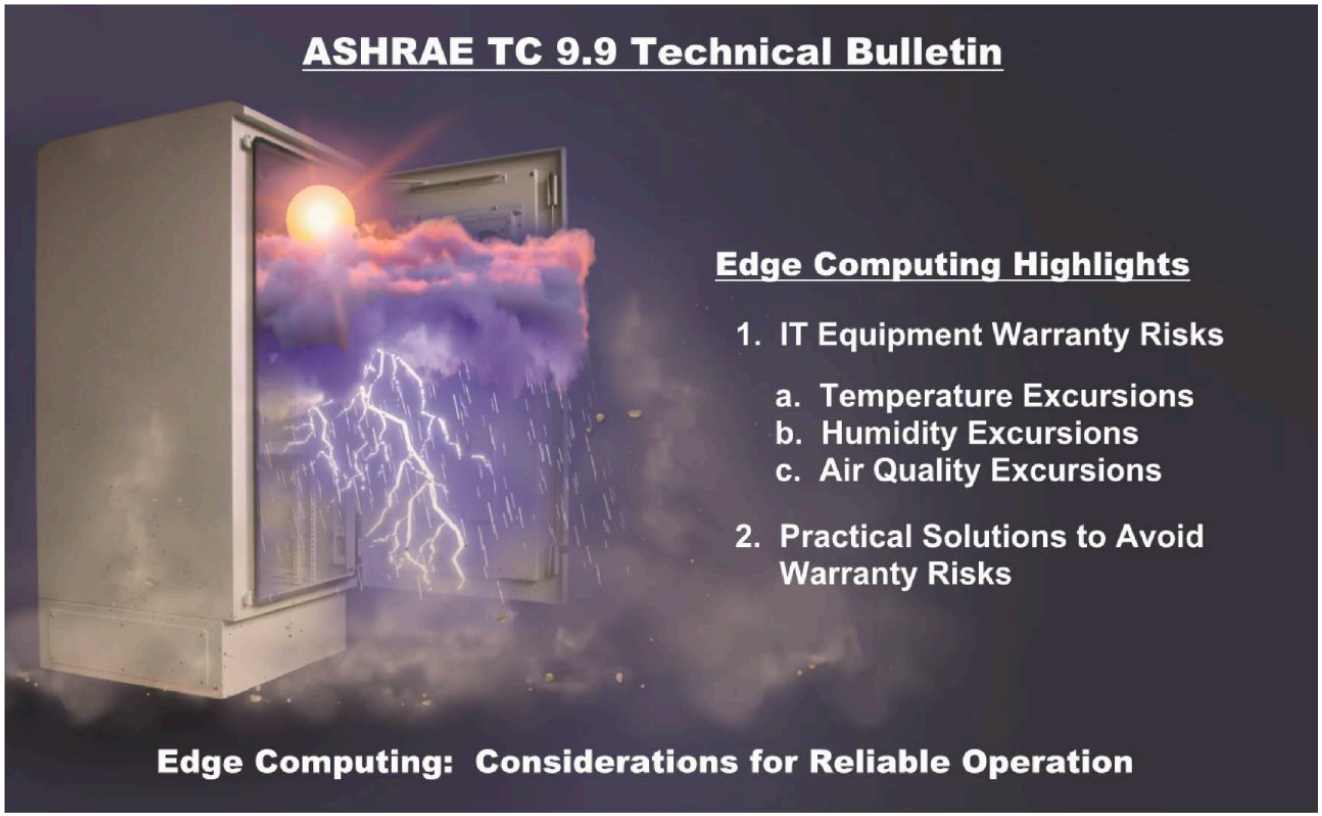
- Aligning facility cooling solutions in support of liquid cooled IT technologies over the life of a data center
- Example deployment strategies that can easily be modified to support a spectrum of liquid cooling solutions

Thank you!

https://www.opencompute.org/

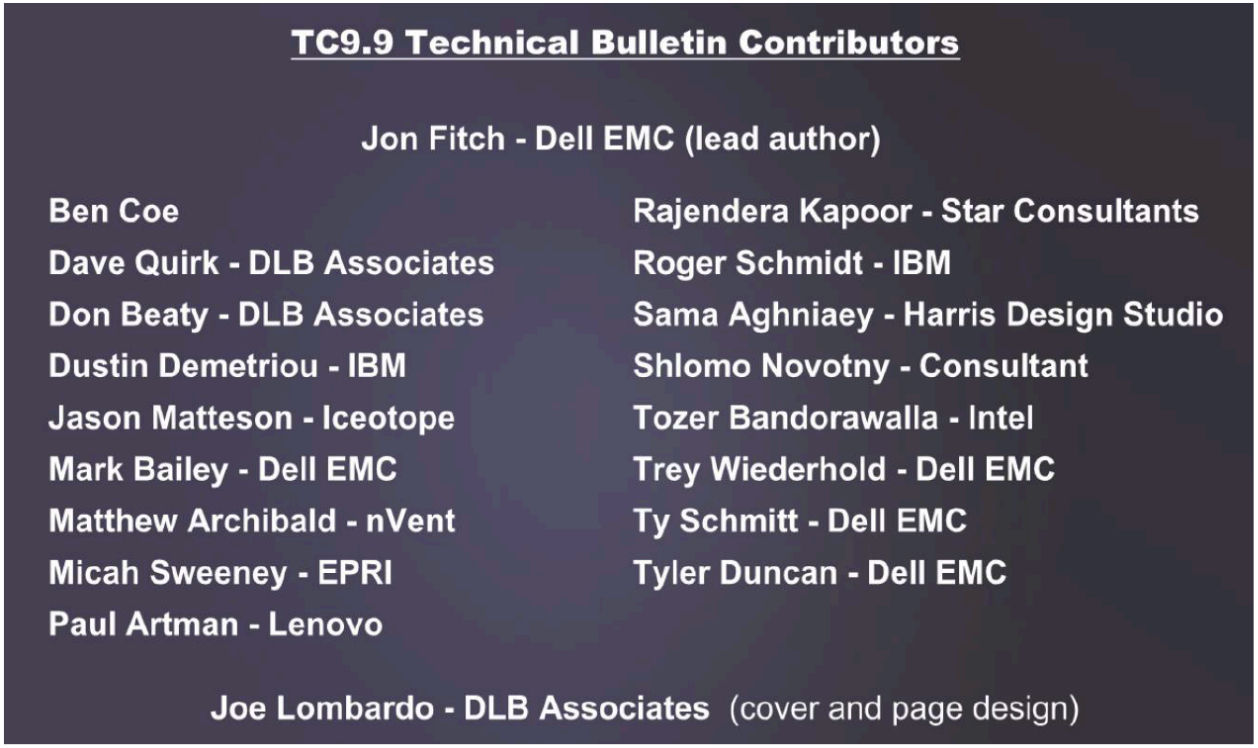
OPEN Compute Project®

Technical Bulletin on Edge Computing



- Carried by top IT industry media outlets
- Excellent exposure for ASHRAE TC9.9

Technical Bulletin on Edge Computing – Cont'd.



- Thank you authors (see above)!
- Special thanks to DLB & Joe Lombardo for cover and page design

Industry Impact

Technical Bulletins - Thoughts

- **Original thought process behind Technical Bulletins:**
  - Make Tech Bulletins different than white papers
  - Short, quick-read format for busy professionals, 8 to 10 pages
  - Fast time to market
  - Actionable information
  - Publish Tech Bulletins on a semi-regular cadence (6 months to 1 year)
  - Create a roadmap of planned Technical Bulletins
  - Give TC9.9 more visibility and impact across the industry

Technical Bulletins - Discussion

- **The Edge Technical Bulletin was well received but formatting was too resource intensive**

- **Should we continue publishing Technical Bulletins?**
  - Who is our target audience and are the TB's effective at reaching them?
  - Can we simplify the formatting?
  - Re-use one simple cover page, keep same loose bulletized format?

- **If yes, what topics should be on the Technical Bulletin roadmap?**

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 have approved

- Comments on Proof of book will be completed this week and sent back to ASHRAE for publication

- Plan is for book to be in the bookstore by summer conference

Preview of Water Class Changes

IT equipment must be compliant over the full range to claim compliance. It was originally written as compliant within the range.

ASHRAE TC 9.9 Hot Aisle Temperatures

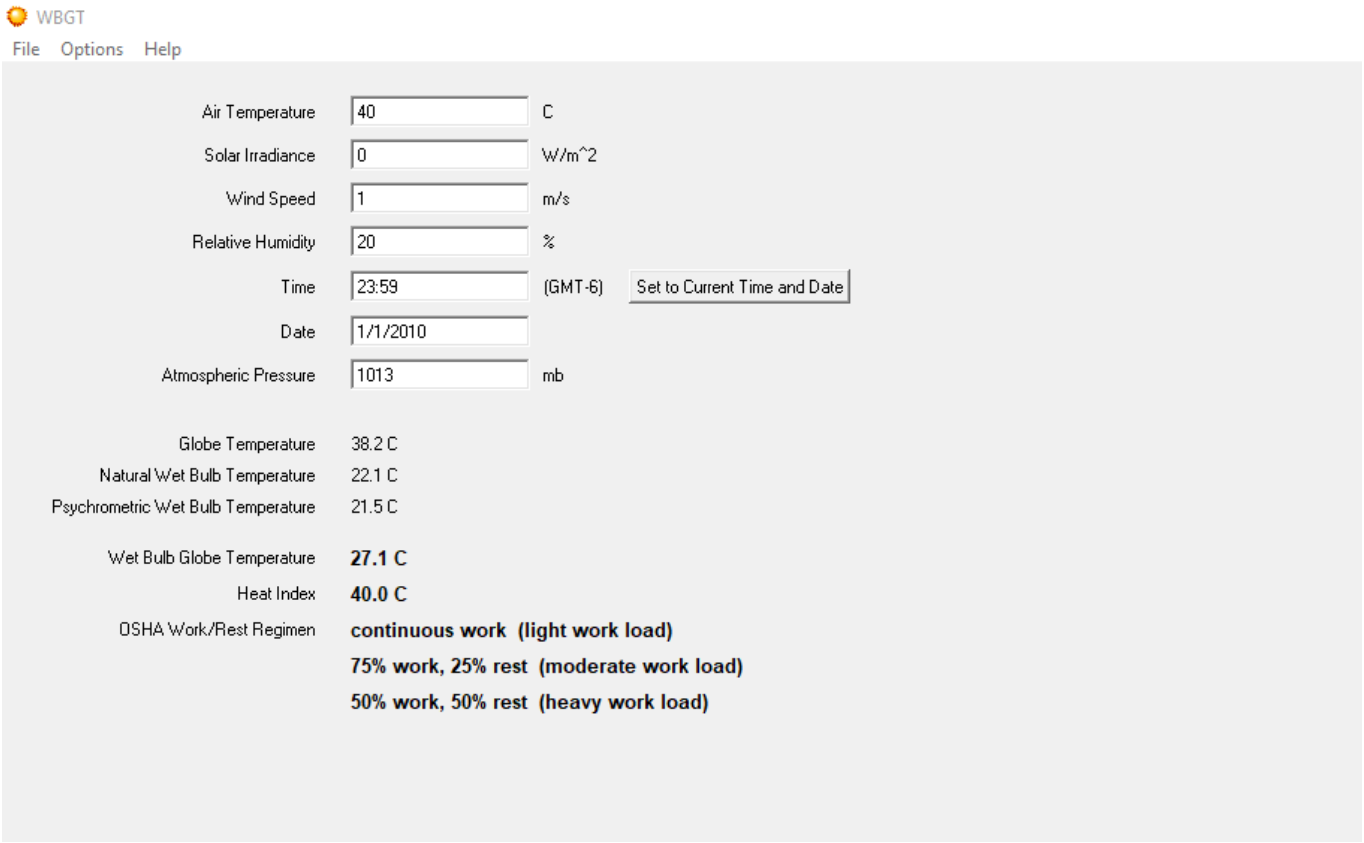
Concern

- Continued drive for increased inlet air temperatures has many owners now asking about occupant safety in hot aisles.

Reference

- Thermal Guidelines have long had reference to OSHA Heat Stress Guidelines in the Appendix
  - How many people read the Appendices?
  - Most online content references outdoor conditions

ASHRAE TC 9.9 Hot Aisle Temperatures



ASHRAE TC 9.9 Hot Aisle Temperatures

How do I calculate the WBGT Index?

The wet bulb globe temperature (WBGT) is calculated by using the following equations.

- For outdoors **with** direct sun exposure:

  $WBGT = 0.7 \times Temp_{wet\ bulb} + 0.2 \times Temp_{globe} + 0.1 \times Temp_{air}$

- For indoors or outdoors **without** direct sun exposure:

  $WBGT = 0.7 \times Temp_{wet\ bulb} + 0.3 \times Temp_{globe}$

where:

$Temp_{wet\ bulb}$ natural wet bulb temperature measured by using a thermometer whose bulb is covered with wet cotton cloth and is cooled by the natural air movement

$Temp_{globe}$ temperature measured using a black globe thermometer

$Temp_{air}$ temperature measured using a conventional thermometer

All temperatures are to be expressed in °C.

ASHRAE TC 9.9 Hot Aisle Temperatures

Table 3. Metabolic Work Rates

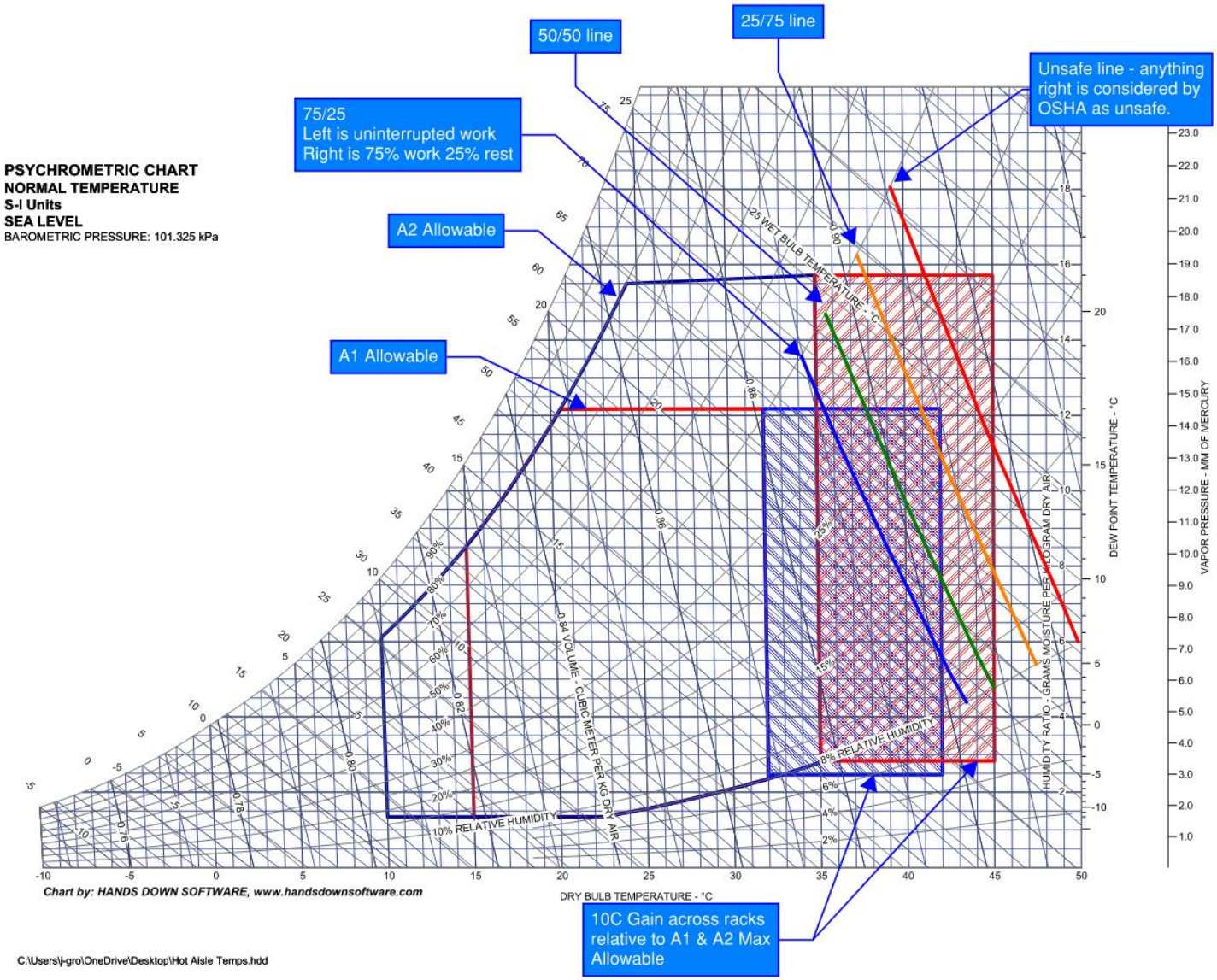
Work Category	Metabolic Rate (Watts)	Examples
Rest	115	Sitting
Light	180	Sitting, standing, light arm/hand work and occasional walking
Moderate	300	Normal walking, moderate lifting
Heavy	415	Heavy material handling, walking at a fast pace
Very Heavy	520	Pick and shovel work

Adopted from: ACGIH "2017 TLVs and BEIs" TABLE 3

Discussion

- How can we better apply OSHA Heat Stress Guidelines to Data Centers?
  - Are Hot Aisle Temps really a problem per OSHA?

ASHRAE TC 9.9 Hot Aisle Temperatures



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

Liquid Cooling White Paper

Thermal Guidelines for Data Processing Environments, 5th Edition

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Title

- Emergence and Expansion of Liquid Cooling in Mainstream Data Centers

Is

- Why move to liquid
- Approximate when

Is not

- Deep discussion on *what* liquid is or *how* to do it optimally

Table of Contents

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Thermal Challenge Increases

°C/W

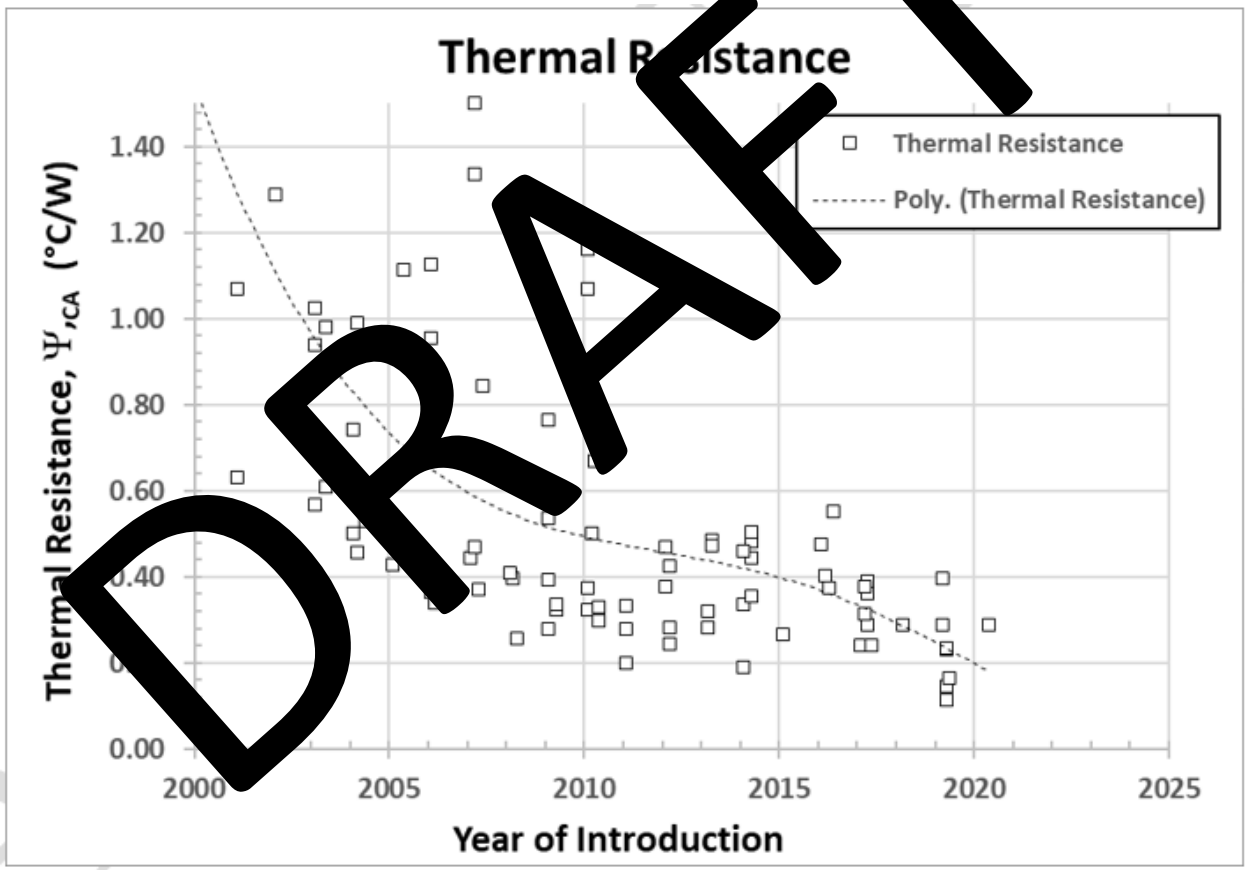
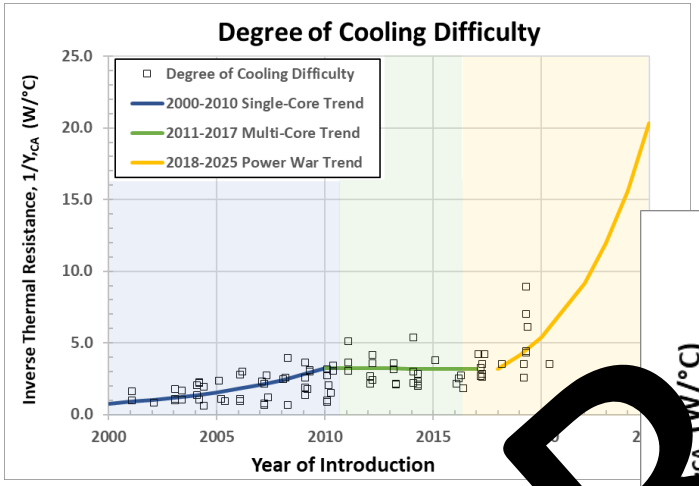
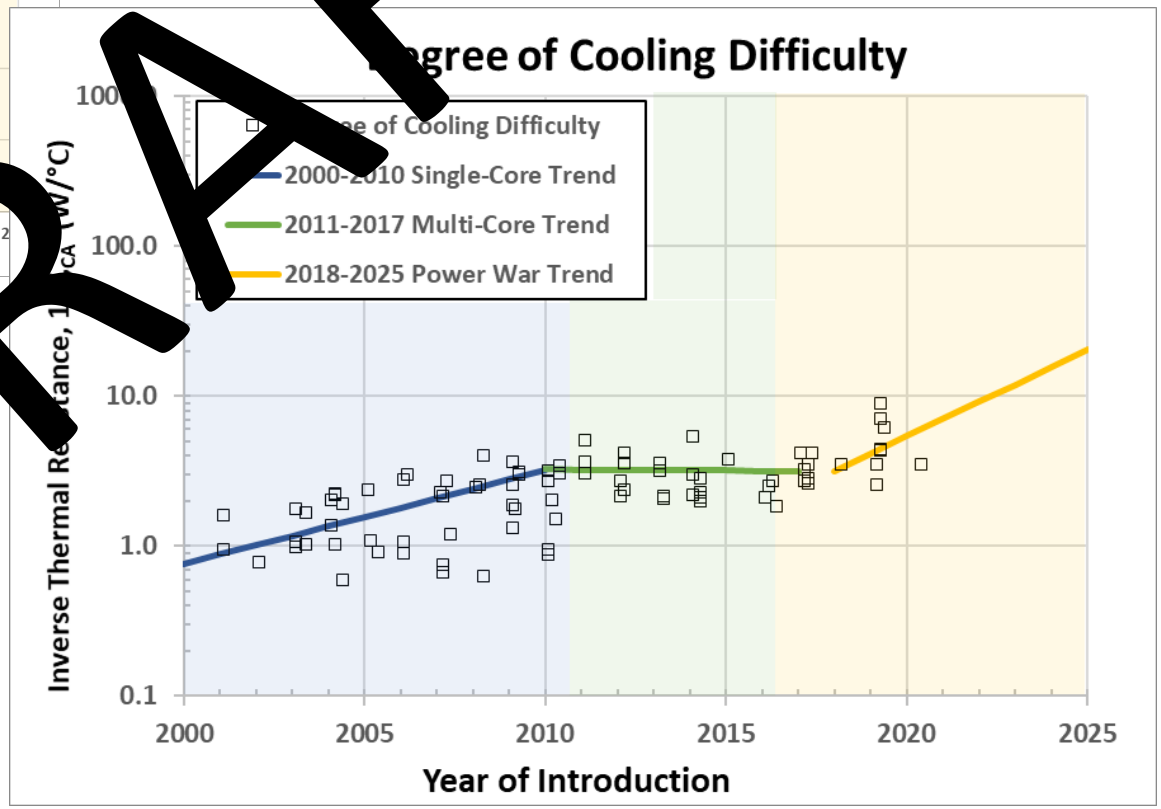


Figure 1: Thermal resistance required to cool socket power.

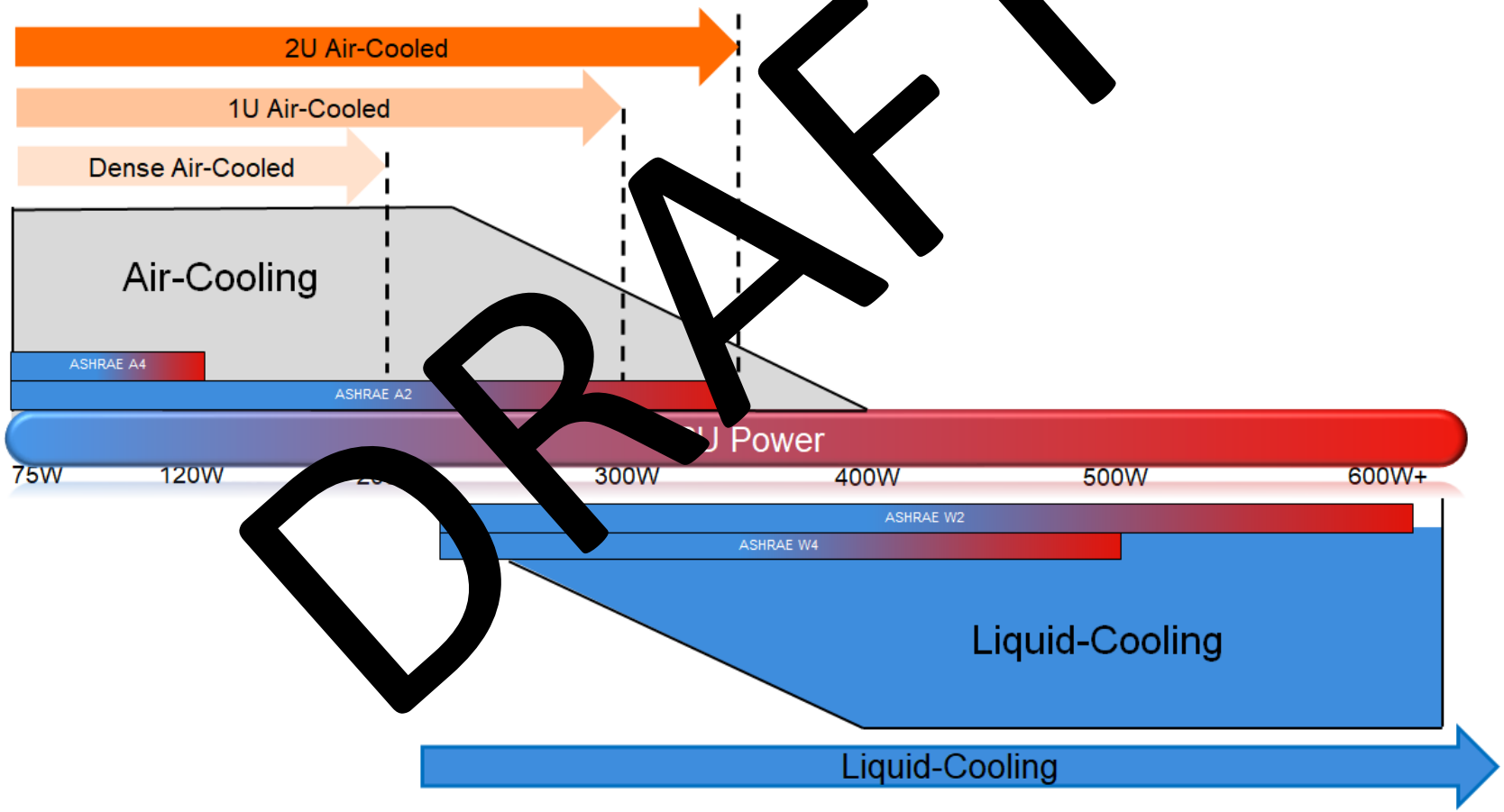
Inverse Metric- "Difficulty to Cool"

W/°C





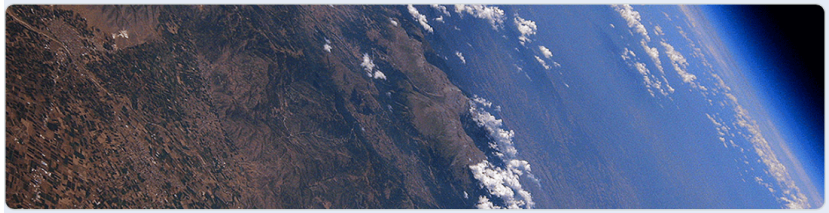
Soft Limits & Temperature Regression of Air and Water



ASHRAE/IEC/NEMA 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
- Proposed updates were discussed via a call into the NEMA July 23rd meeting covering ASHRAE temperature requirements
- NEMA Standards Publication WD-10 – High Ambient Test Procedure for Wiring Devices – has been approved and is in the process of being published
- “The test environment shall be specified at 50 C minimum with higher ambient temperature environments starting at 50 C with increments at 5 C intervals (as example 60 C, 65 C , 90 C , etc.) The results of the testing may indicate a need for appropriate construction.”

Attendance



ASHRAE TC 9.9 Attendance Record

ASHRAE Technical Committee 9.9 - Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment
2021 Winter Meeting
Virtual Event Timing: January 19, 2021
Event Address: https://ashrae-org.zoom.us/j/98449509730?pwd=Q2ZCNFhRQXFTY05CSTNYbElZTkdKQT09
Contact us at tc99chair@gmail.com
Technical Committee Website: http://tc0909.ashraetcs.org

* Required

Name *

Your answer

Email

Your answer

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

http://bit.ly/tc99-attendance

Thank You

TC 9.9 Website:
tc0909.ashraetcs.org

Attendance: https://bit.ly/tc99-virtual-attendance