

## **ASHRAE**

**TC/TG/TRG NO: TC 9.9 Date: June 26, 2017 Location: Long Beach, CA USA**  
**General Meeting/ Subcommittee and Liaison Report**

**TC/TG/TRG TITLE: Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment**

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“These draft minutes have not been approved and are not the official, approved record until approved by this committee.”

<b>VOTING MEMBERS</b>	<b>Employer</b>	<b>Appoint. Year</b>	<b>End Year</b>	<b>Position</b>	<b>Status Code</b>
Andrew R Baxter	Page Southerland	2014	2018	Member	Present
Thomas A Davidson	DLB Associates	2014	2018	Member	Present
Dr. Dustin Demetriou	IBM	2015	2019	Member	Present
Paul R. Finch	Digital Realty Trust	2014	2018	Member	Present
Jon Fitch	Dell	2015	2019	Member	Present
Jack V. Glass	Citigroup – (Retired)	2014	2018	Member	Present
John C Groenewold	JPMorgan Chase	2014	2018	Member	Not Present
David F Kelley	Liebert Corp	2014		Member	Present
Dr. Mukesh K Khattar, PhD.	EPRI	2015	2019	Member	Present
Jason Matteson	Lenovo	2014	2017	Vice Chair	Present
Christopher Muller	Purafil	2016	2020	Member	Present
Richard Pavlak	Heapy Engineering	2014	2018	Member	Present
Jeffrey P Rutt	Department of Defense	2014	2018	Member	Present
Robin A Steinbrecher	Intel (retired)	2015	2017	Chair	Present
Edward Ka Cheung Tsui	Intelligent Technologies, Ltd	2014	2018	Member	Present

<b>Committee Positions</b>	
<b>Name</b>	<b>Position</b>
Robin Steinbrecher	Chair
Jason Matteson	Vice-Chair
John Groenewold	Secretary
Roger Schmidt	IT Subcommittee Chair
Don Beaty	Publications & International Liaison
Nick Gangemi	Programs Subcommittee Chair
Robert McFarlane	Handbook Subcommittee Chair
Richard Pavlak	Standards Subcommittee Chair
David Quirk	Research Subcommittee Chair & 90.4 Liaison
Ecton English	Webmaster

**Programs, Handbook and Research Subcommittee Meetings, Sunday, June 25<sup>th</sup> (note attendance lists only apply for Monday's meeting)**

- General Items – Robin Steinbrecher gave a quick introduction and distributed the sign-in sheet.
- Handbook – Robin Steinbrecher
  - TC 9.9's handbook chair could not attend the conference but briefed Robin Steinbrecher before the meeting. Chapter 19 in the Applications handbook was updated to incorporate changes in the Datacom series of books. The changes/edits were reviewed and approved by the voting members.
- Programs – Nick Gangemi
  - Nick distributed a handout with information about presentations to be made at Long Beach, tracks and dates for Chicago along with tips for making a complete submission on ASHRAE's website.
  - Key dates for the Chicago conference have been loaded on the TC 9.9 website.
  - To find information on any upcoming meeting go to: [ASHRAE.org/\[name of the city\]](http://ASHRAE.org/[name of the city])
- Research – David Quirk
  - 1755 – Dustin Demetriou – The researcher is 10 months into the research. The researchers did not expect as much corrosion as they are seeing. They may be looking to reduce test length as a result. NOX, SO<sub>2</sub>, and ozone exposure are being tested. PMS meeting was to be held on June 26<sup>th</sup>.
  - 1675 – Guidance for modeling of data centers, Mark Seymour – The research still has no lab put together and potential solutions are still under discussion. ASHRAE has been paying out the money to the researcher even though there has been no work. The PMS has been working with the Florida Intl. University administration which has changed recently. No plan has been received although they said that they would provide one by the Long Beach meeting. The updated plan was supposed to include the timeline for this research. There may be a decision by August as a new dean will be in place at FIU. A 2<sup>nd</sup> bidder could be an option. ASHRAE must determine how to recover their money, that's not the responsibility of the PMS. TC 9.9 was co-sponsor. The primary TC responsible, 4.10, is in favor of waiting until August to make a decision. In any case, the PMS must ensure that the funding is still available. Mark Seymour will talk to Mike Vaughn about this.

## Main TC 9.9 Meeting, Monday, June 26<sup>th</sup>

### TC 9.9 Overview and Introductions – Robin Steinbrecher, Dustin Demetriou

- Robin introduced those present to TC 9.9 and its website. All were encouraged to use the website to find the latest information on TC 9.9. It is generally updated by Ecton English in the month before each upcoming onsite meeting with meeting, presentation and seminar schedules. The link to the website is still:  
<http://tc0909.ashraetcs.org/index.php>
- On the site, under the “Membership” tab there is a button “Join TC 9.9” to request TC 9.9 provisional corresponding membership. Membership is free to a technical committee and does not require ASHRAE membership. Provisional membership is for up to a two year period. The chair transitions active people to corresponding membership based on participation. All who want to contribute are encouraged to find at least one topic of interest and connect to the owner of that topic at the annual or winter meetings. The chair can facilitate connections.
- The website has an active link to the datacom books in the ASHRAE bookstore on the main page. Members are encouraged to update their contact information through the ASHRAE website as the TC owner has no control over individuals’ registrations and correct email addresses. If you need to contact the chair you can find the email link on the site’s main page. That address is [TC0909@ashrae.net](mailto:TC0909@ashrae.net) and is always updated to link to the active chair. Suggestions for any changes can be sent to this email.
- Dustin presented the overview of TC 9.9 at a data center conference in Guiyang City in the PRC. The request for the presentation was by CAR (Chinese Association of Refrigeration) to TC 9.9 who has a longtime connection with ASHRAE. He described how this conference is one of the biggest in the world focused on data centers and DC issues. He focused on the thermal guidelines and provided insight into Standard 90.4. There were many questions regarding CFD modeling which he handled after his presentation.
- The overview presentation is available on TC 9.9’s website on the ‘Presentations’ tab.
- All present were allowed to introduce themselves at the meeting. ASHRAE is interested in how many people have signed up for the conference and whether TC meeting attendees are YEA members. Requests for this information was included on the sign in sheet and separately conveyed to ASHRAE.

### Programs – Nick Gangemi

- Nick is the chair for programs and can be contacted at [n.gangemi@northernairtech.com](mailto:n.gangemi@northernairtech.com)
- Nick reviewed the guidelines for submission of seminars, forums, technical papers and conference papers.
- Chicago is the next conference and all dates had passed for paper submissions. Seminar, forum and debate submittal dates were still upcoming. See <http://www.ashrae.org/Houston> for deadline dates for submissions for the next conference where papers can be submitted.
- Nick summarized the approval rates for submitted papers and seminars. As has been the

case in the past, papers have a very high acceptance rate while seminars are typically in the 50% range.

#### **DCIM Publication – Chris Lindberg, Jason Matteson**

- Chris Lindberg is leading the DCIM publication team.
- The committee was initiated in March of 2016. Chris explained mission statement and outline. White paper at over 100 pages so it has been decided that there is enough material that a book will be created rather than a whitepaper.
- There have been 16 key contributors across all segments of the industry.
- High level status: Intro complete; use cases and telemetry 90% complete; connective framework complete; ASHRAE DCIM compliance guidelines 95%; simulation techniques 85% complete. Expect to complete everything in next month or so.
- Both air and liquid systems are addressed. DMTF Redfish alignment is expected which will help to make the nomenclature, sensors and other aspects industry endorsed.
- Jason discussed section 4 in the whitepaper in more detail. They are trying to bridge the gap between IT and facilities to achieve energy savings and asset management. They want to have all IT manufactures come up with a list of what sensors are important. Constructed three tier ratings for both ITE and OT (facilities). IT has 3 tiers and facilities has 3 levels. Over thirty sensors on IT side.
- The team is requesting peer review. Contact Chris for more information.

#### **Liaison Reports**

- **90.1 – Rick Pavlak**
  - Rick provided an overview of 90.1 for educational purposes and information on the latest disconnects between 90.1 and 90.4. In 2008, the DOE recognized the industry reports on high data center high energy usage and requested that ASHRAE get data centers into Standard 90.1. SSPC 90.1 **completed** work to cover DC's in the 2010 standard. This **work** expanded 90.1's scope and defined computer rooms with a 20 W/ft<sup>2</sup> threshold. TC 9.9 members and their companies would be greatly impacted so they responded with many comments from TC 9.9 about added risk and other concerns.
  - TC 9.9 advised 90.1 on differences between data centers and buildings covered by 90.1 already. Because no computer room cooling products were in the standard, TC 9.9 took the burden of getting CRACs and CRAHs in the standard, using information from Standard 127. Also, the requirement for economizers was a problem. TC9.9 came up with key list of exemptions using ASHRAE's commenting process. Nearly all comments were rejected by 90.1 resulting in continuing disappointment in the process for developing standards and disagreement by the DC industry with Standard 90.1.
  - The 2010 standard has two paths for compliance: prescriptive or cost budget method which were both problematic. The 2013 standard added an alternative compliance path based on PUE. The 2016 standard uses AHRI standard for CRAC and CRAH units, but was not successful in coordination with Standard 90.4.
- **90.4 – Terry Rodgers and Dustin Demetriou**

- Robin Steinbrecher – In May, the SSPC members were selected. A new liaison must be selected from the TC 9.9 participants on this new committee. Terry Rodgers and Dustin Demetriou provided an overview of 90.4 to help educate new members to TC 9.9 on the standard and also to provide detail on its implementation.
- Terry Rodgers – ANSI manages process of developing standards. ASHRAE must develop standards aligned with this process or they are not ANSI standards. Terry described how the 90.4 committee was established in 2012 and how the developing standard was reviewed over the years of its development. The International Code Council (ICC) recommended adoption of 90.4 but under a full vote of the council it was rejected which was very unusual. ASHRAE said we have a standard and moved forward anyway. Most states adopt 90.1 directly or adopt thru ICC adoption already. Further work must be done to educate ICC on why 90.4 is needed and should be approved. The process was rushed with little chance to educate ICC voters resulting in the failure for approval.
- Dustin Demetriou – Dustin described the working of 90.4-2016. 90.4 requires compliance for both mechanical load components (MLC) and electrical load components (ELC). He reviewed an example demonstrating the process the design engineer would use for compliance determination. MLC/ELC is similar to PUE in many ways but is usable at the design phase whereas PUE is more applicable for use to an operating data center.
- Q and A with Andy Baxter: Why did the ICC reject 90.4? People just did not know what it was and why and also some confusion about the way ASHRAE presented it to them. Also, almost everything failed due to the first time use of electronic voting. The next chance will be with the 2021 code. The case must be presented by 1-7-19. A chairman of a task force to bridge any gap between 90.1 and 90.4 has been selected by ASHRAE. The end goal is to get the ICC to approve, so that 90.1 is not so influential.
- **SPC127 – John Bean** (Method of Test for rating A/C units for data centers). There has been a huge amount of effort for the most recent 2017 version which is currently out for review. John encouraged all to go to the review the draft and submit comments. If you are commenting, be specific on what you think is incorrect and how to fix it.
- **AHRI 1360 update** – David Kelley. The committee is currently working on an updated 1360 standard in collaboration with the DOE. The new version of 1360 will include ceiling units. There are some AHRI certifications in process.

#### **LBNL DC Activities – Steve Greenberg**

- LBNL's main focus is now on small data centers. They have created a new humidity guide by Vali Sorell. Their webinars have about 300 signups with about half that many participating. They do promote ASHRAE and TC 9.9 information in their webinars.
- <http://datacenters.lbl.gov> is sponsored by the US government and contains a lot of good information.

### **Publication Update – Don Beaty**

- Recent books have been going through the IT subcommittee because they have been primarily IT focused and other participating TC 9.9 members have been consumed with 90.1 and 90.4. Now other books need revision and the participation of more TC 9.9 members is now needed. Don encouraged members to contact him to get involved. Susan Smith commented that the Datacom books on Amazon have been very expensive. ASHRAE should be linked on Amazon to promote all of our books. Don mentioned that ASHRAE gave the PRC license for our books. However, we do not know how to access those books in China. Don mentioned that ASHRAE has ways for companies through lump sum payments for full access to the books. ASHRAE can be contacted for more information.

### **Datacom Book 3 Update – Larry Ollice**

- Larry highlighted the team members and described the fourteen chapters to be revised. There has been good progress except on three or four chapters. He is looking for more helpers, especially peer reviewers. Don mentioned that all future books should provide an overview rather than an introduction.

### **ITE Subcommittee Report – Roger Schmidt (Chair of Subcommittee)**

- **IT Equipment Water Cooling Design Guidelines and Best Practices Liquid Cooling whitepaper** – Roger reviewed the outline and table of contents. Eventually, the team intends to update the Datacom liquid cooling book.
- **Storage Device Working Group – Matt Shumway** – As a result of trying to optimize terabytes/\$ many related risks are surfacing. Matt is leading a whitepaper to address this by the end of this year. Of particular importance is the effect of acoustics (fan noise) on hard drive performance.
- **Power Trends Book – Susan Smith** – Susan provided a quick summary and status on the 3<sup>rd</sup> edition of the book. The draft was approved by the voting members although many comments were received and are under scrutiny now. The book is more aligned with workloads than box size. A more detailed guide is included for use of the data in the book too. The team expects to begin the publishing process by the end of July. She showed some of the charts from the book to describe the changes but questions were not taken. Instead, all were encouraged to attend the seminar on the book to be held at the Long Beach conference.

### **Research Update – Dave Quirk**

- **1675 Data Center CFD modeling** – The researcher, Florida International University, still has no lab. Potential options include going to the second bidder but also trying to increase pressure on FIU. A year has been lost and we may have to start over. The PMS is in consultation with ASHRAE on next steps.
- **1755 – Corrosion research** – The research is moving along well. The literature review has been completed. The researcher provided some early insight. Corrosion is much higher than anticipated so some adjustment in testing may be necessary.

- **Energy modeling research** – this was rejected by ASHRAE but is under development still led by Henry Amistadi. Various groups are participating in supporting DC energy modeling but ASHRAE will not be the driver, nor will it own the results. Dave commented that this will probably not be successful because many of the experts from TC 9.9 and the data center industry will be out of the loop.

#### **Executive Session**

- The Las Vegas minutes were unanimously approved by the voting members. This includes John Groenewald who voted by email.



# ASHRAE TC 9.9

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

<b>Programs, Handbook, Research Subcommittee Meeting</b>				
				<b>Member</b>
<b>First Name</b>	<b>Last Name</b>	<b>Position</b>	<b>Registree</b>	<b>YEA?</b>
Henry	Amistadi	Corresponding Member		
Donald	Beaty	Corresponding Member	X	
Michael	Collarin	Corresponding Member	X	X
Thomas	Davidson	Member		
Dustin	Demetriou	Member	X	
Benedict	Dolcich	Provisional Corresponding Member		
Aaron	Duda	Provisional Corresponding Member	X	
Ecton	English	Webmaster	X	
Paul	Finch	Member		
Jon	Fitch	Member		
Joseph	Gangemi	Program Subcommittee Chair	X	
Jack	Glass	Membership Subcommittee Chair		
Troy	Goldschmidt	Provisional Corresponding Member	X	
David	Grant	Corresponding Member	X	
Steve	Greenberg	Corresponding Member	X	
John	Gross	Provisional Corresponding Member	X	
Xin	Hu	Corresponding Member	X	
Hugh	Hudson	Corresponding Member	X	
Gwenn	Ivester	Provisional Corresponding Member		X
David	Kelley	Member		
Matt	Koukl	Corresponding Member		X
Elizabeth	Langer	Provisional Corresponding Member	X	
Guillermo	Massucco	Corresponding Member	X	
Jason	Matteson	Vice Chair	X	
David	Meadows	Corresponding Member		
Stephen	Mowrer	Corresponding Member		
Christopher	Muller	Member		
Kourosh	Nemati	Provisional Corresponding Member		
Shlomo	Novotny	Corresponding Member		
John	O'Brien	Provisional Corresponding Member	X	
Lawrence	Ollice	Provisional Corresponding Member	X	
Richard	Pavlak	Standards Subcommittee Chair		
John	Peterson	Corresponding Member	X	
David	Quirk	Research Subcommittee Chair	X	
Terry	Rodgers	Corresponding Member		

## ASHRAE TC 9.9

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

Jeffrey	Rutt	Member	X	
Roger	Schmidt	Corresponding Member		
Mark	Seymour	Corresponding Member	X	
Matt	Shumway	Provisional Corresponding Member		X
Susan	Smith	Provisional Corresponding Member	X	
Vali	Sorell	Corresponding Member	X	
Marc	Sorge	Provisional Corresponding Member		
Robin	Steinbrecher	Chair		
Russell	Tipton	Provisional Corresponding Member	X	
David	Tootle	Corresponding Member	X	
Justin	Prosser	Guest	X	
Shelley	Dangoor	Guest	X	X
Jia	Hui	Guest	X	X
Mikhail	Gorbunov	Guest		X

<b>Main TC 9.9 Meeting</b>				
				<b>Member</b>
<b>First Name</b>	<b>Last Name</b>	<b>Position</b>	<b>Registree?</b>	<b>YEA?</b>
Gerardo	Alfonso	Corresponding Member	X	
Henry	Amistadi	Corresponding Member		
Andrew	Baxter	Member	X	
John	Bean	Corresponding Member		
Donald	Beaty	Corresponding Member	X	
Lance	Brown	Provisional Corresponding Member	Y	Y
Jerrod	Buterbaugh	Provisional Corresponding Member	X	
Brad	Cochran	Provisional Corresponding Member	X	
Michael	Collarin	Corresponding Member	X	X
Thomas	Davidson	Member		
Dustin	Demetriou	Member	X	
Benedict	Dolcich	Provisional Corresponding Member		
Aaron	Duda	Provisional Corresponding Member	X	
Ecton	English	Webmaster	X	
Paul	Finch	Member		
Mark	Fisher	Provisional Corresponding Member		
Jon	Fitch	Member		
Clayton	Foster	Provisional Corresponding Member		

# ASHRAE TC 9.9

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

Charles	Freda	Provisional Corresponding Member	X	
Joseph	Gangemi	Program Subcommittee Chair	X	
Jack	Glass	Membership Subcommittee Chair		
Troy	Goldschmidt	Provisional Corresponding Member	X	
David	Grant	Corresponding Member	X	
Steve	Greenberg	Corresponding Member	X	
John	Gross	Provisional Corresponding Member	X	
Xin	Hu	Corresponding Member	X	
Hugh	Hudson	Corresponding Member	X	
Gwenn	Ivester	Provisional Corresponding Member		X
David	Kelley	Member		
Mukesh	Khattar	Member		X
Matt	Koukl	Corresponding Member		X
Elizabeth	Langer	Provisional Corresponding Member	X	
Stuart	Lawrence	Corresponding Member		
Sang	Lee	Corresponding Member	X	
Jason	Matteson	Vice Chair	X	
David	Meadows	Corresponding Member		
Stephen	Mowrer	Corresponding Member		
Christopher	Muller	Member		
Kourosh	Nemati	Provisional Corresponding Member		
Shlomo	Novotny	Corresponding Member		
John	O'Brien	Provisional Corresponding Member	X	
Lawrence	Ollice	Provisional Corresponding Member	X	
Richard	Pavlak	Standards Subcommittee Chair		
Mark	Pavol	Provisional Corresponding Member	X	
David	Quirk	Research Subcommittee Chair	X	
Terry	Rodgers	Corresponding Member		
Jeffrey	Rutt	Member	X	
Roger	Schmidt	Corresponding Member		
Mark	Seymour	Corresponding Member	X	
Matt	Shumway	Provisional Corresponding Member		X
Susan	Smith	Provisional Corresponding Member	X	
Vali	Sorell	Corresponding Member	X	
Marc	Sorge	Provisional Corresponding Member		
Robin	Steinbrecher	Chair		
Russell	Tipton	Provisional Corresponding Member	X	
David	Tootle	Corresponding Member	X	

## ASHRAE TC 9.9

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

Edward	Tsui	Member		
Vincent	Guinnane	Guest	X	
Adam	Williams	Guest	X	
Justin	Prosser	Guest	X	
Shelley	Dangoor	Guest	X	X
William	Mak	Guest	X	X
Jimmy	Kao	Guest	X	X
Jinliang	Wang	Guest	X	X
John	Lewis	Guest		
Tim	Xu	Guest	X	X
Jia	Hui	Guest	X	X
Mikhail	Gorbunov	Guest		X