



**1791 Tullie Circle, N.E./Atlanta, GA 30329
404-636-8400**

TC/TG/MTG/TRG MINUTES COVER SHEET

(Minutes of all Meetings are to be distributed to all persons listed below within 60 days following the meeting.)

TC/TG/MTG/TRG No. TC 9.9 DATE July 13, 2020

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

DATE OF MEETING July 13, 2020 LOCATION ZOOM Meeting- Virtual

MEMBERS PRESENT	MEMBERS ABSENT	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
VOTING MEMBERS	Lex Coors	Chris Balbach
Gerardo Alfonso		Galen Gerig
John H Bean, Jr		Andrew Duncan
Donald L Beaty		Andy Soon
Dustin Demetriou		Rick Heiden
Ecton English		Don Largent
John M Gross, III		Hannah Hoffmann
David F Kelley		John Constantinide
Matt Koukl		Cheng-Xian (Charlie) Lin
Terry L Rodgers		Jim Marsh
Roger R Schmidt		Suzanne Krantz
Christopher O Muller		Vance Payne
Vali Sorell		Kourosh nemati
Dave Meadows		
David L Moss		
CORRESPONDING MEMBERS		
Paul Artman	Joseph Gangemi	
Benjamin Coe	Jack Glass	
Brad Cochran	Ahmed Abdel Salam	
Charles Freda	Raymond Abraham	
David Grant	Antonio Aguayo	
Edward L. Gutowski	Robert Akkerman	
Eric Yang	Stuart Aldridge	
Fabio M. Clavijo	Sajad Alimohammadi	
George DeGroft	Husam Alissa	

Gwenn Ivester	Mohammad Alkiswani	
Henry Amistadi	Shawn Andrews	
Herb Villa	Matthew Archibald	
J. Christopher Larry	Serpil Ari	
Jason Matteson	Jakki Artus	
Jeff Rutt	Sean Ashburn	
Jim VanGilder	George Augustini	
Joe Prisco	Robert Bader	
John Dumler	William Bahnfleth	
John Groenewold	Andrew Baxter	
Jon Fitch	William Beck	
Justin Seter	Chad Beery	
Kevin Hughes	Adenilson Belizario	
Kishor Khankari	Paul Bemis	
Mark Fisher	Satyam Bendapudi	
Mark Malkin	Ng Kai Beng	
Mark Pavol	James Benville	
Mark Seymour	James Betts	
Mark Steinke	Michael Bishop	
Nigel Gore	Byron Blackmore	
Patrick Castelveccchi	Alonzo Blalock	
Paul Finch	James Bogart	
Paul Galloway	Holly Brink	
Gordon Keogh	Rolf Brink	
Richard Pavlak	Douglas Brown	
Robert E. McFarlane	Jerrod Buterbaugh	
Robert Tozer	Wim Buters	
Russ Tipton	Aldo Calvi	
Sang Lee	Nicholas Casale	
Shlomo Novotny	Noe Casalino	
Steve Greenberg	Neil Chauhan	
Tom Davidson	David Chialastri	
Aaron Wemhoff	Dale Cibene	
Osmo Kuusisto	Alan Claassen	
Jimil M. Shah	Michael Collarin	
	Dan Comperchio	
	Howard Cooper	
	Bryce Cox	
	James Coyle	
	Bryan Coyne	
	Craig Crader	
	Greg Crumpton	
	Bob Culver	
	Christopher Daniel	
	Steve David	
	Cuong Dinh	
	Bob Doherty	
	Benedict Dolcich	

	Daniel Donahoe	
	DAVID DONGES	
	Robert Druga	
	Aaron Duda	
	Andrew Dunn	
	Dan Dyer	
	Jacqueline Eaton	
	David Edenburn	
	Michael Edie	
	Dennis Eisenbarth	
	Michael Ellsworth	
	Frank Erceg	
	Hamza Erden	
	Maxwell Evans	
	Jeffrey Ewin	
	Huang Feng	
	Sophia Flucker	
	Clayton Foster	
	Kamran Fouladi	
	David Franczak	
	Michael Frank	
	Terry Frantzis	
	F French	
	Hongwen Gao	
	Kevin Gebke	
	Rajat Ghosh	
	John Gideon	
	Arthur Giesler	
	Robin Gilbert	
	Kenneth Gill	
	Troy Goldschmidt	
	Scott Graf	
	Shaun Green	
	Charles Gullede	
	Dinesh Gupta	
	Kamel Haddad	
	Stephen Halsted	
	John Haney	
	Andrew Harrison	
	Kyle Hasenkox	
	Scot Heath	
	Dennis Hellmer	
	Magnus Herrlin	
	Mathias Hery	
	Robert Hewitt	
	Ted Hight	
	Elly Hiu	
	Chris Hsieh	
	Hugh Hudson	

	Steven Hyde	
	Ming-Ren I	
	J C Ierschot	
	Hifumi Iguchi	
	Madhusudan Iyengar	
	Charles Johnson	
	Rhonda Johnson	
	Gary Johnson, Jr	
	Roger Jones	
	Alex Juncker	
	Alekhya Kaianathbhatta	
	George Kaler	
	Rajendera Kapoor	
	Md Masud Karim	
	Kailash Karki	
	Kanchan Kelkar	
	Daniel Kennedy	
	Michael Kester	
	Rehan Khalid	
	Richard Killian	
	William Kingrey	
	Marvin Kirshenbaum	
	Timothy Kittila	
	Erhard Klotz	
	Paul Knight	
	Srinivas Kodea	
	Michael Koerner	
	Devdatta Kulkarni	
	Jayavant Kumar	
	Pardeep Kumar	
	Sushil Kumar	
	Yuichi Kurihashi	
	Christopher Kurkjian	
	Yiu Wa Kwan	
	Stephen Lahti	
	Colin Laisure-Pool	
	Yuk Kuen Lam	
	David Landsberg	
	Federico Lang	
	Elizabeth Langer	
	John Lanni	
	Geoff Lawler	
	Matt Lawrence	
	Christian Le	
	Allan Lee	
	Bret Lehman	
	Frank Lembo	
	Guillermo Leon Orellana	
	Hsing-Sheng Liang	

	Mike Licitra	
	Nemat Lotfi	
	Francis Allen Lumabas	
	William Mak	
	William Maltz	
	Alessandro Mandelli	
	Noreshvarman Manisagar	
	Eugene Maritz	
	Lawrence Markel	
	Ted Marwitz	
	Caroline Mason	
	Carl Massey	
	Guillermo Massucco	
	James McAleer	
	Timothy McCann	
	Christopher McDermott	
	Jaakko McEvoy	
	Michael McKenna	
	Douglas McLellan	
	Michael McRee	
	Godwyn Mendes	
	Michael Miller	
	Francis Mills	
	Richie Mittal	
	Michael Monahan	
	Mark Monroe	
	Chad Moore	
	Stephen Mowrer	
	Christopher Muller	
	John Murgida	
	Ram Narayanamurthy	
	Philip Naughton	
	C.D Nayak	
	Ian Nelson	
	David Nesheiwat	
	John Neubauer	
	Salah Nezar	
	Michael Nicolai	
	Zuokui Ning	
	Budy Notohardjono	
	John O'Brien	
	Mark Ogilvie	
	Michael Ohadi	
	Sean OHern	
	Lawrence Ollice	
	Shelley Ophir	
	Leslye Paniagua	
	Farid Parsaei	
	Chandrakant Patel	

	Andrew Pearson	
	Thomas Peddle	
	Tim Persoons	
	Craig Petersen	
	John Peterson	
	Benjamin Petschke	
	FLORIN POPA	
	Mani Prakash	
	Justin Prosser	
	Honore'du Puy	
	Suhasini Pyarasani	
	David Quirk	
	Prakash Rapolu	
	David Redford	
	Stuart Redshaw	
	Charles Rego	
	William Reynolds	
	Steven Rosenstock	
	Joel Rutledge	
	Hitoshi Sakamoto	
	Anders Saksager	
	Nestor Salinas	
	Michael Salvatore	
	Peter Samain	
	Angela Sampaio	
	Michael Schwarz	
	Michael Schwedler	
	Clifford Scofield	
	Darshit Shah	
	Anthony Sharp	
	Timothy Shedd	
	Saurabh Shrivastava	
	Matt Shumway	
	Ruben Sidranski	
	Thursten Simonsen	
	Mark Simpson	
	Shelby Sims	
	Satwinder Singh	
	Annelise Smith	
	Grant Smith	
	Stuart Smith	
	John Song	
	Marc Soucy	
	Ronald Spangler	
	Jonathan Spreeman	
	Mark Sprenger	
	Jeffrey Stein	
	Robin Steinbrecher	
	Morgan Stevens	

	Charles Stewart	
	Michael Streich	
	Robert Sullivan	
	Kaiyu Sun	
	David Sundin	
	Jacob Svenkeson	
	Micah Sweeney	
	Inn Tang	
	SOON TATT	
	Edwin Teoh	
	Jeff Tepler	
	Ronald Thomas	
	David Tootle	
	Sengul Topuz	
	Chad Tramonte	
	Jeff Trower	
	William Tschudi	
	Edward Tsui	
	Saahil Tumber	
	Marianna Vallejo	
	James Vallort	
	Richard Velten	
	David Vranish	
	Darrin Watson	
	Ralph Webb	
	Andrew Wengerd	
	Kurt Wetzel	
	Malcolm White	
	Katherine Whitenack	
	Robert Wichert	
	Casey Winkel	
	Larry Wong	
	Stephen Woollard	
	Stephen Wren	
	Lixia Wu	
	Yang Zou	
	Wangda Zuo	
	Kenneth Peet	
PROVISIONAL CORRESPONDING MEMBERS		
Jonell Watson	Mina Abiedallah	
Sama Aghniaey	Hassan Ali Younes	
Pooya Navid	Ramanathan Arumugasamy	
Kapil Nath Mehrotra	Tozer Bandorawalla	
David McGlocklin	Kenneth Beach	
Philip Yu	Adenilson Belizario	
Ali Akber Kazmi	Rakesh Bhatia	
	Erich Binder	

	Dustin Bremner	
	CILLIAN BROWN	
	Julia Call	
	Jian Wen Chan	
	Vijayakumar Chithambaram	
	Byron Coetser	
	Kevin Connor	
	Florin Corcoz	
	Biswajit De	
	Brian Derby	
	Charuchandra Dewasthale	
	Shivraj Dhaka	
	Jon Elfi	
	Adam Fleming	
	Terry Fletcher	
	Michael Geraghty	
	Michael Gibbons	
	Mike Gilkerson	
	John Han	
	Xu Han	
	Michael Hathorne	
	Mohamed Hegazy	
	Ali Heydari	
	Peter Koneck-Wilwerding	
	Alexandre Kontoyanis	
	Steve Krupka	
	Cheng-Xian Lin	
	Christopher Malone	
	M.R. Mannex	
	DONALD Mitchell	
	Lucas Moreira	
	Balakrishnan P Panicker	
	Carine Saliba	
	Mohit Shrivastava	
	Thomas Sin	
	Jeremy Smith	
	Ameya Soparkar	
	Timothy Startt	
	Russell Taylor	
	Sharon Thomas	
	William Ung	
	Christopher Wilson	
	Bruno Winge	
	David Yancosky	

Published Agenda

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 Constantidine
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

Total Time 2 hours 50 minutes

Meeting Notes

- I. Introductions (**Dustin Demetriou**)
 - a. Welcome and Introductions
 - i. Meeting Start time: 10:00am EDT
 - ii. Web Meeting Procedural Discussion on meeting attendance logging and usage of Zoom.
 - iii. Meeting Attendance Link: <https://bit.ly/tc99-virtual-attendance>
 - iv. Reviewed Code of Ethics
 - v. Reviewed Meeting Agenda
 - . Webmaster
 - i. Reviewed TC 9.9 Website with links to meeting agenda and link to attendance
 - ii. Noted Past Meeting Minutes are posted to the meeting.
 - iii. Website is consistently updated.
 - . TC 9.9 Update/ Overview
 - i. Discussed TC9.9 Overview including Title, Purpose, and Scope
 - ii. Over 400 members including corresponding members
 - iii. Discussed the various groups that are actively involved and make-up the committee
 - iv. Discussed areas of Influence.
 - v. Discussed DataCom books and timeline associated publications.
 - vi. Discussed DataCom books and current publications along with procurement method and the ability to receive a discount for multiple book purchases.
 - vii. Discussed Current committee publications
 - viii. Reviewed LinkedIn website. <https://www.linkedin.com>
 - ix. Discussed Officers & Membership
 1. Roster change now occurs in August vs. July.
 - . Reviewed Liaisons to other committees.

- 1. New group Cybersecurity- Ecton English is participant
- . Discussed Voting Members
 - 1. In August John Groenewold will become a voting member with Chris Muller's voting member term ending.
- . 2020 Voting activity- The following items were approved by the voting members.
 - 1. Sea Salt RTAR
 - 2. Edge white Paper
 - 3. Orlando Meeting Minutes
 - 4. Thermal Guidelines 5th edition
- . Membership
 - 1. PVCM (81 as of 7/2020)
 - 2. Corresponding Member (335 as of 7/2020)
 - 3. Ensure ASHRAE Profile is up-to-date with current email address is kept up-to-date as this determines.
 - 4. If wanting to join TC 9.9, use TC.9.9 website to join.
- . COVID-19 Preparedness
 - 1. ASHRAE has various websites to discuss re-opening and documents to support information.

II. Program (Dustin Demetriou)

- a. General Program Update
 - i. Discussed overall Virtual Summer meeting and events
 - 1. Available Monday June 22: 80 on demand sessions + 12 live sessions and can be viewed for the next 18 months.
 - 2. Live 4 day event: Monday June 29-July 2nd
 - a. 12 featured technical sessions presented live and available for download.
 - b. Sessions addressing COVID-19 pandemic
 - c. Live form for Q&A with speakers
 - d. Liv Chat sessions and Virtual networking happy hours
 - . Next meeting is in Chicago Jan. 23-27, 2021
 - 1. Reviewed Tracks and Chairs
 - a. Environmental Health Through IEQ
 - b. Building Performance and Commissioning for Operation and Management
 - c. Energy Conservation
 - d. International Design
 - e. Standards, Guidelines and Codes
 - f. Mini Track- Virtual Design.
 - 0. Reviewed Important dates.
 - a. Conference papers are no longer available
 - b. Ability to submit seminar is still available. August 3rd is deadline for submission. Contact Nick Gangemi. 585-721-8795
Nick.GANGEMI@bureauveritas.com
 - 0. Reviewed Program types and associated details of each paper.
 - a. Technical Paper Sessions
 - b. Conference Paper
 - c. Workshops
 - d. Panels
 - e. Forums
 - f. Debates
 - g. Seminars

0. Questions

- a. We were going to do something on 90.4 - then Covid hit. Any thoughts on doing this for Chicago?
 - i. Yes, this would be appropriate and would need to reach out to Nick.

Research (Mark Seymour)

a. 1675-RP: Guidance for CFD Modeling (Mark Seymour)

- i. Co-sponsor TC4.10
- ii. Reviewed Scope: Provided guidance on how to model a Data Center via CFD
- iii. Florida International University (FIU)
 - 1. Lab at FIU wasn't capable of performing research
 - 2. FIU subcontracted the Lab work to GA Tech.
- iv. Experimental work
 - 1. Testing data are being collected
 - 2. Server simulators has been verified and checked to confirm accuracy
- v. CFD work
 - 1. Numerical simulations are ongoing and testing results are being compared
- vi. Project Management
 - 1. Subcontract has been extended by March 2021, no cost extension.
 - 2. Discussed timeline and schedule of events to come.
- vii. Next steps...
 - 1. Continue in-lab work
 - 2. Continue modeling
 - 3. Compare the results
 - 4. Complete report
- viii. Lab layout.

Laboratory Layout

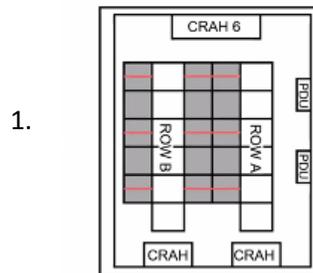


Figure 1 – Room layout. Red line shows the racks temperature measurements were taken in.

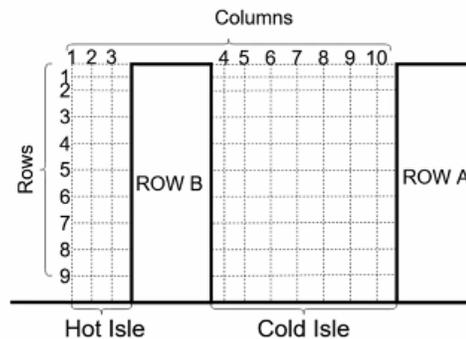


Figure 2 – Rack layout. Intersection between the numbered dotted lines represents the sensor placement.

- a. Using 56% free area floor tile
- 2. Initial measurements were taken but issues found, needed to get measurement tools in the correct configuration, etc.
- 3. Discussed measurement locations
- 4. Discussed CFD Model set-up
 - a. Noted the use of server simulators in the data center
- 5. Discussed initial CFD model runs and results
 - a. Reviewed initial findings and the correlation of the data.

- b. Server flow rate is reduced 5-15% when running in the rack due to the external pressure drop.
 - c. The Thermal profile of the CFD simulation is highly sensitive to the entrainment at the two ends of the cold aisle.
 - ix. Discussed timeline
 - 1. Complete the results comparison of the baseline case and minimize the discrepancies.
 - 2. Complete CFD simulations.
 - 3. Complete written report.
 - 4. 8 weeks to complete study
 - 5. Anticipate completion before end of the year.
 - x. Reviewed questions:
 - 1. If this CFD program is not designed for data center systems, how will this research translate to the programs that are on the market for this specific purpose?
 - a. Every general purpose CFD program or data center specific will have different features and the guidance will be applicable to all programs. The intent is to validate programs that are being used to ensure the tools are capable of modeling and the results are similar from program to program. Additionally, a good user is needed to perform the modeling to understand the nuances of the different tools.
 - 2. Think we will need to compare how components are modeled VS. what we see in programs we are used to
 - a. Yes, many activities are in general purpose tools. Sometimes specific modeling actions need to be performed in the general purpose CFD tools vs. a more data center specific tool.
 - 3. Are all CFD simulations steady-state or are some transient simulations included.
 - a. Modeling is done using steady-state
- b. Sea Salt Work Statement (Roger Schmidt)**
- i. 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.
 - ii. RTAR was developed by Roger Schmidt and Jensen Zhang with intent to submit in May.
 - iii. Looking for TC 2.4 support and co-sponsor. Didn't have a chance to vote
 - iv. Completed Draft of work statement for review
 - v. Vote in TC 2.4 was approved 15-1 with a few comments. There are a few modifications needed based upon the feedback from TC 2.4
 - vi. No past research or papers have discussed electronic equipment located in coastal regions. No information on marine environments on material constructing IT Equipment.
 - vii. Goal to look at increasing free-cooling hours and improve data center efficiency.
 - viii. Draft of work statement could go in August 15, but likely will hold off until a later date for submission.
 - ix. Reviewed questions/ comments
 - 1. You should also consider TC 2.3 as a co-sponsor based on input relevant to airborne corrosion due to gaseous contaminants.
 - 2. It is very important to study DRH of Sea Salts in order to limit RH considerations.
 - 3. You can have chlorine (Cl₂, HCl?) emanating from sea salt aerosol. This would be good to investigate further.
 - 4. If the "wetting" RH humidity is so low, it would seem to make our research on humidity and static very important.

I. Handbook (Bob McFarlane)

- a. Chapter 20
 - i. New Handbook comes out in 2023.
 - ii. Chapter needs to Read Chapter 20
 - iii. Provide recommendation for changes or updates. Form is on the website
 - iv. Only two people have submitted

II. International (Don Beaty)

- a. International Update
 - i. No Update
- b. Publications
 - i. Whitepaper for Edge Computing
 - ii. Paper will be done in a different format (Landscape).

III. Break- 15 Minute

Reminder to complete the google form for attendance.

VII. Liaison Reports

a. Standard 90.1 - Rick Pavlak

- a. 90.1 published last year 2019 version, next full publication will be 2022
- b. Not much new and continuing to work on addendums that were left over and working on creating new ones.
- c. Last year had a renewable energy requirement. Addendum has been published.
- d. R. Pavlak will be writing a brief narrative to summarize addendum to have published on the website.
- e. New Addendum on Refrigeration pipe insulation and was a gap in the standard and wasn't covered.
 - i. Has been issued for public review 1 and will be going out for 2nd public review.
- f. ASHRAE has a new head of standards with regards to codes. 90.1 and 90.4 will be under this person guidance.

b. Standard 90.4 - Dave Kelley

- a. 90.4 published new version in fall of 2019
- b. April 2020 phone call meeting
- c. (2) meetings in the summer for the " summer meetings"
- d. Activities
 - i. Addressed Public review comments from Addendums A, B,D and agreed with most all the comments and made some small adjustments and voted out the addendums.
 - ii. Voted out addendums to address some wording in section 11.3 on shared services.
 - iii. ASHRAE Fact sheet for 90.4 and had some figures that an individual commented on upon review and thought the values in the fact sheet were incorrect and asked for information on the values.
 - 1. Looking for anyone to provide articles that have data to confirm and clarify number of data centers and energy use of data.
 - iv. Henry Amistadi has come-up with many calculations that show compliance of 90.4
 - 1. 1st set of calculations were for air cooled cooling systems.
 - 2. Looking at having these calculations as part of an addendum, however it would be significantly larger than the standard due to the number of systems.
 - 3. Might be something that could be initially published as white paper or might look to have them as a datacom book?
 - v. Discussed the Electrical working group and the incoming electrical service.

1. Looking to define the electrical service in additional detail. July 21st is the next meeting. Bob McFarlane or Marcus Hassen. August 7th is the next mechanical working group.
 - vi. Anticipated next meeting sometime in August.
- c. AHRI 1360 - Dave Kelley**
- a. Last published in 2017.
 - b. Started working in May looking to update the standard
 - i. Adding Rooftop Units
 - ii. External wall-mount vertical units.
 - iii. Have reached out to manufacturers
 - c. Incorporating comments from DOE and DOE is active in the review and development
 - d. Anticipating that this will have more alignment with SPC-127 and potentially eliminating certain items certain items and moving to SPC-127
 - e. Publish 1st quarter of 2021.
 - f. ASHRAE 27 and 127 is the testing standard
 - g. AHRI 1360 will address the rating of different types of equipment.
- d. SPC-127 - John Bean**
- a. Method of Testing for Rating Air conditioning Units Serving Data Center (DC) and other Information Technology Equipment (ITE) Spaces.
 - b. Current standard is 2012
 - c. Current status
 - i. 3rd review of SPC127-2012R
 1. Independent Substantive Chance (ISC) Public Review
 2. Closed with zero public review comments
 - ii. Motion to publish Jun 9th, 2020
 1. Chair to issue letter ballot of Jun 22, 2020 through July 6th, 2020
 2. 9 Yes votes, 0 no, 0 abstain, 3 ballots not returned.
 3. Motion to publish passed
 - iii. Publication submittal packaged to ASHRAE July 7th, 2020
 1. Anticipates potentially a few changes but nothing to major.
 - iv. Anticipates publication in the near futures
 - v. Proposed that SPC-127 would become a Standing Special Projects Committee (SSPC) for continued maintenance.
 1. There's an ongoing evolution of equipment and methods for cooling data centers
 2. There are several needs identified in the 2nd Full Public Review that should be addressed as addendums
 3. There is ongoing need to collaborate and align with AHRI 1360
 4. Would propose that TC 9.9 would take this up at the next TC9.9 business meeting.
 - vi. Comments/ Questions
 1. Looking at 127 and GWP and potentially pushing forward lower GWP Refrigerants.
 - a. Might be something that 1360 wants to pick-up and could potentially look at TEWI as another rating for the equipment.
- e. SSPC 300, Guideline 1.6 - Terry Rodgers**
- a. SSPC 300- committee that manages Standard 202.
 - b. GPC-1.6 Commissioning Data Centers
 - c. Work in progress

- d. Multiple subcommittees working on the development of content
- e. Forward, TPS complete
- f. Definitions have been substantial completed and determining which definitions to be completed
- g. OPR and BOD are in the process of completing CFR are in progress. Lots of progress by Jim McGee.
- h. Larry Ollice has been managing the commissioning specs.
- i. Significant amount of work still to go
- j. Looking for Cx Agents involved in the data com world.
- k. Contact Terry Rodgers for getting involved. terry.rodgers@bureauveritas.com
- l. Question

- . What standard covers data center ventilation?

- 1. Standard ASHRAE 62

f. Building EQ Methodology Subcommittee (John Constantinide)

- a. Overview
 - i. Web based product to benchmark similar buildings energy in the same climate zone.
 - ii. Not an energy modeling tool
 - iii. Calculates Building EUI
 - iv. Performs both *In Operation* and *As Designed* assessment
- b. Operation Assessment
 - i. Uses meters Energy Bills for Energy usage.
 - ii. Reflects how the building is designed, used, and operated.
 - iii. Most common application is for existing buildings.
 - iv. Rating from 0 (zero net Energy) to 200 (energy inefficient)
- c. Methodology
 - i. In Operation Building Performance Score
 - 1. Building EQ: $EUI_{\text{metered}}/EUI_{\text{baseline}} \times 100$.
 - 2. Baseline is a normalized value for the building type and square footage.
 - ii. Scoring and rating has some challenges when being applied to data center due to the high energy use per square ft.
 - iii. Has a multi-use property building property type.
 - 1. Could separate out the data center from an office or high rise type building.
 - iv. Lab type buildings were also rated and developed using multiple types of categories/questions to better define.
 - v. EUI's calculated for source energy using U.S. national site-to-source factors.
 - vi. Tool has the potential to break out different areas of the building for different types of use cases.
 - vii. Looking for individuals to attend meetings and help to characterize data centers
 - 1. Meetings held monthly, next meeting: August 13th
 - 2. 2nd Thursday of each month from 11am-12pm est.
 - viii. As Designed Building Score
 - 1. Evaluate potential energy use - Predictive score.
 - 2. Uses standardized energy model
 - 3. Independent of building occupancy and operating conditions
 - 4. Rating of 0-200
 - 5. Same rating as In Operation but using an energy model as the inputs.
 - ix. Working closely with ASHRAE standard 2.11 and expects to get a "level 1" or "level 2" data to complete the score
 - x. Questions/ Comments

1. Do not try to use building area as a means for scoring data center efficiency
2. Couldn't this use the ITE energy instead of building area? Similar to 90.4 already does
3. Seems like this is something like a modified PUE
4. The workload type for the data center and the operating load have a huge impact on the energy efficiency. The energy efficiency curve is highly dynamic based on several factors
5. The redundancy model will also play into the efficiency
6. So many data centers in service never reach their design capacity, as they are over-provisioned during design and construction. This makes comparing energy utilization vs design energy utilization misleading
7. Does this correlate in any way with the way EnergyStar is awarded?
 - a. Yes and no. Energy star is an energy rating from an operation perspective and is not an asset type. Has a simplified energy use for data centers using PUE.
8. When does EIA plan to update CBEC for data centers?
 - a. Unknown from the group. Using 2003 CBEC. Energy Star is using 2012 CBEC.
9. How is the information from BEQ currently used (i.e. regulations)?
 - a. Not a standard but wants Government groups to advocate for building EQ to show compliance with another standard.
- xi. Contact Information John Constantinide: jmc@mail.ashrae.org , Lilas Pratt lpratt@ashrae.org

VIII. IT Subcommittee

a. Edge Computing Technical Bulletin- Jon Fitch

- i. Environmental Considerations for Reliable Operation of Edge Computing
- ii. In final formatting at DLB Associates
- iii. Expects release in August
- iv. New format of document
 1. Short ~10 pages.
 2. Propose ongoing publication of Technical Bulletins on~6 months cadence on topics of highest industry interest.
- v. Get out to the industry via media outlets, standards organizations, and other various outlets.
- vi. Track bulletin and see who's paying attention.
- vii. Track social media attention
- viii. See if this drives sales of DataCom Books.
- ix. Evaluate effectiveness
- x. Comments/ Questions
 1. Is this "new form of publication" something originated by TC 9.9, or is it something ASHRAE has created that we are just using for the first time?
 - a. It is a new format designed by TC 9.9 & coordinated with ASHRAE
 - b. Likely about to get out to the market quicker.
 2. I like the concept. "White Paper" means so many different things and can range from great to useless. Hope TC 9.9 gets some recognition for this.

b. Thermal Guidelines 5th Edition- Roger Schmidt

- i. Out for voting member to review
- ii. Main reason for update is to include the updates on RH.
 1. Main changes

- a. Copper and silver coupon testing strongly recommended twice yearly
 - b. Coupon testing resulting in less than 300A/200A- allows up to 70%RH
 - c. Coupon testing resulting in greater than 300A/200A- set below 60% RH as specified in the 4th edition of this book or below 50%
 - d. Added new high density air cooled class (H1)- allowable upper temperature limit set to 25°C (Class A1-32°C); recommended upper temperature limit of 22°C (classes A1-A2; 27°C)
2. Other changes included removed some duplicate reference materials that's covered in the Liquid Cooling IT Power trends Datacom Books.
 3. Several reviews and updates have been completed; voting members now have final draft for final review and vote
 4. Plan is to be in bookstore by year-end.
 5. Comments/ Questions
 - a. Any changes on temperature/RH setpoint recommendation of the switchgear/transformer/UPS room in the 5th edition?
 - i. No Changes, not put into the booklet.
 - . Control on Dewpoint setpoint
- c. IEC Connector Harmonization- Roger Schmidt**
- i. ASHRAE environmental envelopes appear to be in conflict with operating environments with more basic safety standards used to define cables, connectors, applicable couplers, receptacles, etc.
 1. Connector/ cable is specified at the local ambient connection at 35C at max current
 2. Exhaust server is 50-60°C with the current temperature conditions.
 3. Not in alignment and standards for connectors are in much lower ambient conditions.
 - ii. IEC/UL/CSA/NEMA standards for plugs, connectors, wiring, cabling need to be consistent with requirements for maximum environmental conditions of IT equipment deployed in Data Centers.
 - iii. Draft procedure prepared by the NEMA Ad HOC chairman.
 - iv. NEMA draft procedure is intended for high ambient temperature environments starting at 50°C with increments at 5°C intervals and going up to 105°C. Would likely require constructions for electrical components for the ambient conditions specified at the highest temperatures.
 - v. Proposed updates will be discussed via a call into the NEMA July 23rd meeting covering ASHRAE temperature requirements. Anticipate having a IT manufacturers join the call.
- d. Data Center Power Equipment paper**
http://tc0909.ashraetcs.org/documents/ASHRAE_TC0909_Power_White_Paper_22_June_2016_REVISED.pdf
- e. Cold Weather Shipping White Paper- Joe Prisco**
- i. Final Draft complete
 - ii. 2 weeks for review and final comments.
 - iii. Anticipated in August for voting members for review and comment.
 - iv. 19-20 pages.
 - v. Would like to have out before winter.

IX. Meeting concluded 12:49PM EST

Executive Session – Dustin Demetriou

- Not Held