



1791 Tullie Circle, N.E./Atlanta, GA 30329

404-636-8400

DRAFT

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 June 24

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

DATE OF MEETING June 24, 2018 LOCATION Houston, Texas

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
VOTING MEMBERS				Mr Shawn Andrews
Mr Jason Matteson	2014	Mr John C Groenewold	2014	Mr Marcus Hassen
Dr Dustin Demetriou	2015	Mr Andrew R Baxter PE PE	2014	Mr Benjamin Petschke
Mr Richard L Pavlak, PE	2014	Mr Thomas A Davidson	2014	Annie Smith
Mr Jack V Glass	2014	Mr Jon Fitch	2015	
Mr Paul R Finch	2014	Dr Mukesh K Khattar, PhD	2015	
Mr David F Kelley	2014	Mr Christopher O Muller	2016	
Mr Jeffrey P Rutt	2014	Mr Edward Ka Cheung Tsui	2014	
CORRESPONDING MEMBERS				
Mr Robert E McFarlane	2011	Mr Raymond Abraham		
Mr Joseph D Gangemi	2005	Mr Deepak Agarwal		
Mr David V Quirk, PE	2007	Mr Robert Akkerman, PE	2014	
Mr John H Bean, Jr	2008	Mr Stuart Aldridge, PE	2011	
Mr Donald L Beaty	2004	Mr Gerardo Alfonso	2013	
Mr Frank Erceg, PE, CPE	2012	Mr Henry Robert Amistadi	2012	
Mr Arthur L Giesler		Mr Paul T Artman		
Mr Hugh Hudson	2014	Mr Rangarajan Arulseivan		
Mr Matt Koukl	2013	Mr K M Asawa		
Mr David L Moss	2002	Mr Sean Ashburn	2011	
Mr Stephen A Mowrer		Mr Frank Atkinson		
Mr Shlomo Novotny	2002	Mr Robert James Bader	2014	
Mr John P O'Brien	2016	Prof William P Bahnfleth, PhD, PE	2004	
Mr Justin Tyler Seter	2013	Mr Farhad Banisadr	2012	
Mr Mark James Seymour	2012	Mr William E Beck	2007	
Mr Vali Sorell	2005	Mr Bob Beer		
		Mr Chad E. Beery	2012	

	Mr Volkmar H Bender	
	Mr Ng Kai Beng	
	James Betts	2014
	Mr Michael R Bishop	
	Mr Byron P Blackmore	
	Mr Alonzo B Blalock	2010
	Mr Bob Blough	
	Mr Gary Bowdler	
	Mr Sbastien Brasseur	2012
	Mr Mark Burtwell	
	Tahir Cader	
	Mr Aldo R Calvi, PE	2011
	Mr Don Carless	
	Mr Eric M Carter, PE	2012
	Mr Nicholas A Casale	2014
	Mr Noe E Casalino	2011
	Mr John P Castelveccchi, Jr,	2011
	Mr Neil Chauhan	
	Dr Victor A Chiriac	
	Mr Herman Chu	
	Mr Dale R Cibene, LEEd AP	2011
	Mr Alan Claassen	
	Mr Fabio M Clavijo, PE	
	Mr Michael M Collarin, PE,	
	Dan Comperchio	
	Mr Howard M Cooper	
	Mr Lex Coors	2012
	Mr David Copeland	2003
	James P. Coyle, PE, LEED AP, CEM, EBCP	2013
	Mr Craig A Crader	
	Ms Kelley P Cramm, PE	2017
	Mr Matthew Cronmiller	2014
	Mr Bob Culver	
	Mr Christopher George Daniel	2012
	Mr Steve David	
	Mr George W Degroft, III	2012
	Mr George Demetriou	
	Mr Bob Doherty	
	Dr Daniel N Donahoe, PE	2014
	Mr Robert Michael Druga, PE	
	Mr John Duffin	
	Mr John Dumler	
	Mr Andrew David Dunn	
	Mr Dan Dyer	
	Mr Michael Edie, PE	2011
	Mr Dennis E Eisenbarth, PE	2009
	Mr Michael J Ellsworth, Jr	2013
	Mr Jeffrey Ewin, PE	2014
	Mr Huang Jin Feng	2012

	Mr Gregory K Fennewald		
	Mr Kevin Fletcher	2005	
	Mr Philip Flinn		
	Mr Stephen Kam-Shun Fok	2014	
	Dr Kamran Fouladi	2009	
	Mr Michael Frank	2012	
	Mr Terry Frantzis		
	Mr F William French		
	Mr Paul Galloway		
	Mr Hongwen Edwin Gao		
	Mr Jeff Gatlin, PE	2014	
	Mr Kevin J Gebke		
	Mr Mark H Germagian		
	Dr Rajat Ghosh		
	Mr John R Gideon, III	2008	
	Mr Robin Gilbert		
	Mr Kenneth E Gill, PE	2003	
	Mr John Golder		
	Dr Krishnan Gowri, PhD	2015	
	Mr David Grant, PE		
	Mr John Greco	2011	
	Steve Greenberg		
	Mr Charles E Gullede, III		
	Mr Edward L Gutowski, PE	2011	
	Dr Kamel Haddad, PhD	2012	
	Mr Stephen C Halsted		
	Mr John Haney		
	Mr Andrew Leven Harrison		
	Mr Kyle W Hasenkox		
	Mr Scot Heath	2012	
	Mr Michael S Heinrich	2015	
	Mr Dennis G Hellmer	2002	
	Dr Magnus K Herrlin, PhD	2002	
	Mr Ted Hight		
	Mr Elly Hiu		
	Mr Daniel M Hughes		
	Mr Kevin Hughes	2011	
	Mr Mark M Hydeman	2004	
	Mr Akio Idei		
	Mr J C Ierschot		
	Mr Madhusudan K Iyengar	2011	
	Mr Ted Frank Jagusztyn	2010	
	Dr Charles E Johnson, PE		
	Mrs Rhonda Johnson	2007	
	George Jones	2013	
	Mr Er Toh Siam Hui Joseph		
	Mr Alex Juncker	2013	
	Mr George M Kaler, Jr	2012	
	Mr Rajendera K Kapoor, PE,		
	Dr Kailash C Karki		

	Mr Kanchan Kelkar	
	Mr Daniel Kennedy	2012
	Dr Michael Kester	2014
	Dr Kishor K Khankari, PhD	2012
	Mr Richard Scott Killian	
	Mr William M Kingrey	2011
	Mr Marvin S Kirshenbaum	
	Mr Timothy A Kittila	2011
	Mr Erhard Klotz	
	Mr Paul Knight	2012
	Mr Michael J Koerner	2010
	Dr Devdatta Prakash Kulkarni	
	Mr Pardeep Kumar, PE	2011
	Mr Sushil Kumar, PE	
	Mr Christopher W Kurkjian, PE	2005
	Mr Osmo Ensio Kuusisto	2010
	Mr Alfred Kwong	
	Mr Tim J Lehotsky	2011
	Mr Stephen Lahti	
	Mr David A Landsberg	
	Mr John W Lane	
	Mr Federico Sebastian Lang	2014
	Mr John Lanni, PE	
	Mr Jon Christopher Larry, P.E.	
	Mr Geoff Lawler	
	Mr Matt Lawrence	
	Mr Stuart Lawrence	2011
	Mr Christian Le	
	Mr Sang Lee	
	Mr Bret W Lehman	
	Mr Frank A Lembo	2008
	Ms Suzanne LeViseur, PE	2015
	Dr Hsing-Sheng Liang	
	Mr Mike Licitra	2011
	Mr Michael J Linde	
	Mr Damion John Lock	
	Mr Nemat Lotfi	
	Mr Lu Luna	
	Mr Chris Malanga, PE	2009
	Dr Christopher G Malone	2005
	William Maltz	
	Mr Alessandro Mandelli	2010
	Mr Francis Allen Marcelino Lumabas	2014
	Mr Lawrence C Markel	
	Mr Ted Marwitz	2013
	Miss Caroline Mason	2012
	Mr Ronald Norman Mays	
	Mr James P McAleer	
	Mr Timothy S McCann	2005

	Mr Greg McDonald	
	Mr Michael F McKenna	2011
	Mr Douglas K McLellan	2008
	Mr David Cumming Meadows, II	2011
	Mr Godwyn Mendes	
	Mr Zuheir Mheir	
	Mr Francis A Mills	2007
	Mr Richie Mittal	2014
	Mr Michael Monahan	2010
	Mr Mark Monroe	2013
	Mr John Mouritsen	
	Mr John J Murgida	
	Mr John Musilli	
	Mr Sanjeev Nangia	
	Mr Ram Narayanamurthy	
	Mr Philip J Naughton	2011
	Mr C.D Nayak	
	Mr David Michael Nesheiwat	2011
	Mr John G Neubauer PE	2013
	Mr Michael Nicolai	
	Prof George Agwu Nnanna	2008
	Mr Budy D Notohardjono	
	Mr Rodney R Oehlers	
	Mr Mark Fraser Ogilvie	2011
	Prof Michael M Ohadi, PhD	2012
	Mr Guillermo Leon Orellana	2013
	Mr Zarko Palavra	
	Mr Sanjay Panchbhaya	
	Mr Steven Parris	
	Mr Chandrakant D Patel	
	Dr Michael K Patterson, PhD	2005
	Mark Pavol	
	Dr Andrew B Pearson, PhD, CEng	
	Mr Kenneth C Peet	
	Mr Craig H Petersen	2011
	Mr John Peterson	2009
	Mr Rahul M Phansalkar	
	Mr William T Pienta	
	Mr Andrew P Prandoni	
	Mr Joseph F Prisco	
	Mr Vidyasagar Puthran	
	Mr Honore'du Puy	
	Mr David S Redford	2014
	Mr Mark N Reed	
	Dr Gamal Refai-Ahmed, PhD	
	Mr Charles W Rego	
	Mr William Reynolds	
	Mr Steven Rosenstock, PE	
	Mr Joel Rutledge, PE	2013

	Mr Nestor Hugo Salinas, Sr		
	Mr Michael Salvatore		
	Mr Peter M Samain		
	Mr Michael Schwarz	2011	
	Mr Michael CA Schwedler		
	Mr Clifford M Scofield		
	Mr Ian Seaton	2010	
	Mr Darshit R Shah, Eng		
	Mr Anthony C Sharp		
	Prof Timothy A Shedd, PhD		
	Mr Saurabh K Shrivastava PhD	2011	
	Mr Thursten D Simonsen, PE,		
	Mr Mark J Simpson		
	Ms Shelby L Sims		
	Mr Satwinder P Singh, P. Eng	2012	
	Mr Grant Smith	2002	
	Ms Susan F Smith		
	Mr John Song	2013	
	Mr Marc A Soucy		
	Mr Ronald T Spangler	2013	
	Mr Jonathan C Spreeman	2010	
	Mr J F Stack	2005	
	Mr Jeffrey R Stein		
	Mr Benjamin L Steinberg		
	Mr Robin A Steinbrecher	2002	
	Mr Morgan J Stevens	2012	
	Mr Charles Bartlett Stewart, PE	2011	
	Mr Jeremiah Stikeleather	2011	
	Mr Robert F Sty, PE	2012	
	Dr Robert F Sullivan		
	Mr Abhishek Sundaram		
	Dr David Sundin	2013	
	Jacob Svenkeson		
	Mr Inn Tang, P.Eng		
	Mr Edwin Teoh	2012	
	Mr Jeff Tepler		
	Mr Ronald R Thomas, PE		
	Mr David C Tootle		
	Mrs Sengul Topuz	2012	
	Dr Robert M Tozer, PhD	2012	
	Mr Chad D Tramonte		
	Mr Sean G Treweek		
	Mr Jeff P Trower		
	Mr William Tschudi		
	Mr Saahil Tumber	2012	
	Dr Marianna Vallejo		
	Mr James W VanGilder, PE		
	Mr Michael R Vaughn PE		
	Mr Richard M Velten, PE		
	Mr Herb Villa	2007	

	Mr Riccardo Degli Effetti	2016
	Dr Hamza Salih Erden	2018
	Mr Maxwell Evans	2017
	Sophia Flucker	2018
	Mr Clayton Foster	2017
	David Franczak	2017
	Mr Charles F Freda	2017
	Dr Reza Ghias, PhD	2016
	Troy Goldschmidt	2017
	Scott Graf	2017
	Mr Shaun Green	2017
	Mr Robert F. Hewitt	2017
	Mr Chris Hsieh	
	Mr Steven Korey Hyde	2017
	Mr Hifumi Iguchi	2017
	Mr Julian Iosifescu	2017
	Miss Alekhya Kaianathbhatta	2017
	Abdullah Karimi	2016
	Mr Vijay Kasibhatla	2017
	Mr Rehan Khalid	2018
	Mr Srinivas Kodea	2018
	Mr Yuichi Kurihashi	2017
	Mr Yiu Wa Kwan	2017
	Mr Yuk Kuen Lam	2017
	Elizabeth Langer	2017
	Mr Allan Lee	2018
	Mr William Mak LEED AP BD+C	2017
	Mr Mark P. Malkin	2017
	Mr Christopher McDermott	2017
	Mr Jaakko McEvoy	2017
	Mr Michael E Meakins	2016
	Mr Brian W. Meneghan	2016
	Mr Michael L Miller, PE	2017
	Mr Chad E Moore, PE	2017
	Mr Zuokui Ning	2017
	Dr Sean C OHern	2017
	Mr Lawrence D Ollice, Jr	2016
	Mr Denis O'Mahony	2017
	Mr Christopher O'Reilley	2016
	Mr Andrew J Osborn	2016
	Dr Leslye Paniagua	2018
	Mr Farid Parsaei	2017
	Mr Thomas Peddle	2018
	Dr Tim Persoons	2018
	Mr Justin Mark Prosser	2017
	Miss Suhasini Pyarasani	2018
	Mr Prakash Rapolu	2017
	Dr Stuart Peter Redshaw, PhD	2017
	Mr David A Ritter	2016
	Mr Lance Ruetimann	2016

	Mr Ryan S Lime	2016
	Dr Hitoshi Sakamoto	2017
	Dr Ahmed H Abdel Salam	2017
	Ms Angela Sampaio	2018
	Mr Gary P Shamshoian	2016
	Mr Matt Loren Shumway	2017
	Mr Ruben Sidranski	2017
	Dr Prabjit Singh	2016
	Stuart Smith	2018
	Mr Marc A Sorge	2016
	Miss Kaiyu Sun	2017
	Mr David Vranish	2017
	Dr Aaron Wemhoff	2018
	Mr Stephen Lee Wren PE	2018
	Mr Yang Xiao	2016
	Mr Eric Yang, CPMP, HBDP, CEAP	2017
	Dr Yang Zou	2018
	Benjamin Zuk	2017

DISTRIBUTION: All Members of TC/TG/MTG/TRG plus the following:

TC9.9 Chair: Jason Matteson	Tc99chair@gmail.com
All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters (Research, Standards, ALI, etc.)	See ASHRAE email alias list for needed addresses.
Mike Vaughn, Manager Of Research & Technical Services	MORTS@ashrae.net

Note: These draft minutes have not been approved and not the official, approved record until approved by the TC.

Topic	Time	Presenter
Programs	15	Nick Gangemi
Handbook Revision Update	20	Bob McFarlane
Research		
1675-RP : Guidance for CFD Modeling of Data Centers	15	Mark Seymour
1755-RP : Impact of Gaseous Contamination and High Humidity on IT Equipment Corrosion	15	Dustin Demetriou
Energy Modeling Update	15	Vali S.

Call to Order:6/24/18 5:11PM Jason Matteson

- Introductions and Welcome
 - Programs handbook and research meeting
 - Jason Matteson Current Chair, Dustin Demetriou- Vice Chair
 - Next meeting to be Kansas City, MO for the Summer Conference
 - Sign-in sheet being passed

- 2:15 to 7:00PM Monday meeting
- Program update- Nick Gangemi
 - Conference Meeting Sponsored or co-sponsored)
 - Monday June 25 8-9:30 Seminar 23
 - Wednesday June 27 8-9:30 Conference paper Session 15
 - Conference Papers
 - 127 conference papers submitted, 105 approved, 67 papers presented, 20 paper sessions
 - 21 Technical papers, 14 technical papers presented, 4 paper sessions
 - 100 seminars submitted
 - 72 seminars presented
 - Atlanta Winter Meeting - Jan. 12-16, 2019
 - Friday August 3 Seminar, workshop, Forum, Debate, Panel submissions due (Proposal Due)
 - Submissions need some level of development rather than just a thought
 - 2-3 months to complete PowerPoint... 3 weeks prior to Atlanta meeting PowerPoint to be submitted to ASHRAE for review.
 - Conference is much earlier than normal
 - Reach out to Nick with questions
 - Tracks For Atlanta
 - Track 1: Systems and Equipment
 - Track 2 HVAC&R Fundamentals and Applications
 - Track 3 Refrigeration
 - Track 4: Construction, operation, and maintenance of High Performance Systems
 - Track 5: Common System Issues and Misapplications
 - Track 6: The Convergence of Comfort, Indoor Air Quality, and Energy Efficiency:
 - Track 7: Building Integrated Renewables and Natural Systems
 - Track 8: The Engineer's Role in Architecture
 - See TC9.9 website for additional information
 - Kansas City Summer Meeting - June 22-26, 2019
 - Conference paper abstract, tech papers, paper sessions requests due: August 21, 2018
 - Conference paper due November 30, 2018

- Tracks 1-9: See website or contact Nick
 - Research Summit track 8: research that is proposed, completed, in progress... doesn't have to be ongoing research... not many submissions.
 - Track 9 mini-track
 - Contact Nick Gamgemi for questions
 - Additional Discussion
- Handbook Revision Update
 - Update to the 2015 handbook update
 - Extension approved
 - Not as much to do as compared to the full rewrite of the chapter
 - Designed to parallel Datacom books series
 - 2017 Out of Sequence (OOS) Update
 - Added Humidity Control info per ASHRAE Research
 - Added "Refrigerant -side Economizers"
 - Increased CFD Information & TGG "PI" Metric
 - Added AHRI Std. 1360 & 1361-2016 for CDPR A/C
 - Added reference to ASHRAE Std. 90.4
 - Update incorporation delayed to 2018 due to ASHRAE Liaison Problems
 - 2019 Chapter update due July 19, 2018... if ASHRAE Receives be end of July.
 - TC 9.9 gen short extension due to OSU delay
 - Anticipating no later than Aug.15
 - Update now incorporated into On-line Text
 - Updates must be done via ASHRAE "Authoring Portal"
 - Can only be accessed Via "Internet Explorer"
 - Can have multiple people simultaneously editing the document
 - <https://authoring.ashrae.org/>
 - Writers must have access Codes & Training
 - Available Online
 - Updates to Occur
 - Overview on updates
 - Update book series Listing
 - Loads & Power Trends
 - Multiple revisions from "Design Considerations" Book
 - Updates to Book
 - Useful Datcom resources

- Update “Contamination” per research Project
- Water efficiency, Incorporating TGG WUE Metric
- Include Li-ion Batteries UPS Section
- Address vibration effects on hard drives, including Gas FP release
- Server Classifications: Add Hyperscale Infrastructure
- Add LED & POE Lighting to “Lighting Section
- Clarify Fan Suitability for Ducted Supply
 - Resolve conflicts between paragraphs
 - Examine “Centralized AHU systems” for clarity
- Improve Air Distribution Section
 - Issues with too many grate tiles
 - Issues with fan assisted tiles
 - Velocity for overhead supply ducts
- Clarify PUE Purpose
 - Advise how PUE can get worse with more efficient IT Hardware
- General Clarity Edits & typo corrections
- General Update of References & Bibliography
- Noted Presentation Review Team
- V. Sorrell had concerns about TGG endorsement vs. referencing the standard.
- Case studies about the PUE would be a good white paper or seminar
- Look at addressing the potential impact to compute efficiency using liquid cooling (Direct to Chip Cooling)
- Research
 - 16750 RP- Mark Seymour
 - Funding has been awarded and was provided to FIU-
 - Initial to be completed by March 2017
 - Lab was not suitable for the work
 - Preliminary modeling undertake successfully
 - Hardware/ provided and acquired
 - Server simulators designed, supplier identified and prototype to be delivered soon
 - Contractor sub-contracting lab work at GA. Tech who have lab
 - Preliminary modeling has occurred of the Ga Tech lab.
 - No cost extension to end Q1 (Completion end of next march) Jan 2020 likely to have presentation on research.

- Progress is being made
- 1755- RP- Dustin Demetriou
 - Timeline
 - Award June 30,2016
 - Expected completion date: June 30,2018
 - PI requested - No-cost extension
 - Date December 31
 - Syracuse Univ. research facility lab and PI
 - Various research experiments were proposed and tested to validate lab
 - In Chicago, The PMS Approved
 - Final set of experiments to be done designed to look at four combinations of pollutants. Namely O3, O3+NO2; O3+SO2; O3+NO2+SO2
 - Lots of data has been collected to date
 - No Cost extension requested by ASRHAE & PMS
 - Additional time needed for testing of Coupons
 - Remove uncertainty
 - Re testing to validate data
 - Develop recommendations based upon data for determining how High the humidity can go up to A1
 - Early results are pointing to positive movement up to expanding the humidity
 - Research meeting Monday June 25 7:30 to 9:00 Hilton 3rd Floor, 336B
- SSPC300- Terry
 - GPC 1.06- under TC 7.9
 - New Guideline to be drafted
 - Looking for support from TC 9.9 to participate on committee
 - Steve Wiggins POC for signing-up
 - Recently formed 6/24/16
 - Approved Title Purpose and Scope
 - Under SSPC 300
 - Committee will meet once a month on conference call
 - Meetings will
 - Terry will be liaison to TC 9.9
- Energy Modeling Update- Vali S.
 - Looking to develop simplified data center energy modeling solution- continued from Henry Amistad

- Take an approach to move past the existing energy modeling systems
- Writing an outline or manual for performing an energy calculation for a data center.

Meeting was had 6/24 to continue development on the outline on how to calculate the energy. Looking at the major items needed for the calculations. Outline is still in progress and will be distributed for further review and comment.

Conference calls to occur for follow-up

Contact Vali Sorrelll to receive email and to get involved.

Overview of Monday 6/25/18 Agenda

6:27 PM Meeting Concluded (2nd Time)

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 June 25

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

DATE OF MEETING June 25, 2018 LOCATION Houston, Texas

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS ATTENDANCE
VOTING MEMBERS				
Mr Andrew R Baxter PE PE	2014	Dr Mukesh K Khattar, PhD	2015	Mr Shawn Andrews
Mr Thomas A Davidson	2014	Mr Christopher O Muller	2016	Mr Stephen Carey
Dr Dustin Demetriou	2015	Mr Richard L Pavlak, PE	2014	Mr Mihir Nandkedyar
Mr Paul R Finch	2014			Mr Benjamin Petschke
Mr Jon Fitch	2015			Mr Christopher Thomps
Mr Jack V Glass	2014			Mr Adam Williams
Mr John C Groenewold	2014			
Mr David F Kelley	2014			
Mr Jason Matteson	2014			
Mr Jeffrey P Rutt	2014			
Mr Edward Ka Cheung Tsui	2014			
CORRESPONDING MEMBERS				
Mr John H Bean, Jr	2008	Mr Raymond Abraham		
Mr Donald L Beaty	2004	Mr Deepak Agarwal		
Mr Eric M Carter, PE	2012	Mr Robert Akkerman, PE	2014	
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Mr Frank Erceg, PE, CPE	2012	Mr Henry Robert Amistadi	2012	
Mr Joseph D Gangemi	2005	Mr Paul T Artman		
Mr Kevin J Gebke		Mr Rangarajan Arulselvan		
Mr Arthur L Giesler		Mr K M Asawa		
Mr John Gross		Mr Sean Ashburn	2011	
Ms Gwenn Ivester	2016	Mr Frank Atkinson		
Mr Matt Koukl	2013	Mr Robert James Bader	2014	
Mr Sang Lee		Prof William P Bahnfleth, PhD, PE	2004	
Mr Guillermo Daniel Massucco, Sr		Mr Farhad Banisadr	2012	
Mr Robert E McFarlane	2011	Mr William E Beck	2007	
Mr David Cumming Meadows, II	2011	Mr Bob Beer		
Mr David L Moss	2002	Mr Chad E. Beery	2012	
Mr Stephen A Mowrer		Mr Volkmar H Bender		
Mr Shlomo Novotny	2002	Mr Ng Kai Beng		
Mr John P O'Brien	2016	James Betts	2014	
Mark Pavol		Dr Niels Bidstrup Phd	2015	

Mr David V Quirk, PE	2007	Mr Michael R Bishop	
Mr Terry Rodgers		Mr Byron P Blackmore	
Mr Roger Schmidt		Mr Alonzo B Blalock	2010
Mr Justin Tyler Seter	2013	Mr Bob Blough	
Mr Mark James Seymour	2012	Mr Gary Bowdler	
Mr Vali Sorell	2005	Mr Sbastien Brasseur	2012
Dr Mark E Steinke	2016	Mr Mark Burtwell	
Mr Russ Tipton		Tahir Cader	
Mr Saahil Tumber	2012	Mr Aldo R Calvi, PE	2011
Dr Marianna Vallejo		Mr Don Carless	
Mr James W VanGilder, PE		Mr Nicholas A Casale	2014
		Mr Noe E Casalino	2011
		Mr John P Castelvechi, Jr,	2011
		Mr Neil Chauhan	
		Dr Victor A Chiriatic	
		Mr Herman Chu	
		Mr Dale R Cibene, LEEd AP	2011
		Mr Alan Claassen	
		Mr Fabio M Clavijo, PE	
		Mr Michael M Collarin, PE,	
		Dan Comperchio	
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		Mr Matthew Cronmiller	2014
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		Mr Bob Doherty	
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		Dr Kamran Fouladi	2009
		Mr Michael Frank	2012

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	Mr F William French	
	Mr Paul Galloway	
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	Mr Robin Gilbert	
	Mr Kenneth E Gill, PE	2003
	Mr John Golder	
	Dr Krishnan Gowri, PhD	2015
	Mr David Grant, PE	
	Mr John Greco	2011
	Steve Greenberg	
	Mr Charles E Gulledege, III	
	Mr Edward L Gutowski, PE	2011
	Dr Kamel Haddad, PhD	2012
	Mr Stephen C Halsted	
	Mr John Haney	
	Mr Andrew Leven Harrison	
	Mr Kyle W Hasenkox	
	Mr Scot Heath	2012
	Mr Michael S Heinrich	2015
	Mr Dennis G Hellmer	2002
	Dr Magnus K Herrlin, PhD	2002
	Mr Ted Hight	
	Mr Elly Hiu	
	Mr Hugh Hudson	2014
	Mr Daniel M Hughes	
	Mr Kevin Hughes	2011
	Mr Mark M Hydeman	2004
	Mr Akio Idei	
	Mr J C Ierschot	
	Mr Madhusudan K Iyengar	2011
	Mr Ted Frank Jagusztyn	2010
	Dr Charles E Johnson, PE	
	Mrs Rhonda Johnson	2007
	George Jones	2013
	Mr Er Toh Siam Hui Joseph	
	Mr Alex Juncker	2013
	Mr George M Kaler, Jr	2012
	Mr Rajendera K Kapoor, PE,	
	Dr Kailash C Karki	
	Mr Kanchan Kelkar	
	Mr Daniel Kennedy	2012
	Dr Michael Kester	2014
	Dr Kishor K Khankari, PhD	2012
	Mr Richard Scott Killian	
	Mr William M Kingrey	2011

	Mr Marvin S Kirshenbaum	
	Mr Timothy A Kittila	2011
	Mr Erhard Klotz	
	Mr Paul Knight	2012
	Mr Michael J Koerner	2010
	Dr Devdatta Prakash Kulkarni	
	Mr Pardeep Kumar, PE	2011
	Mr Sushil Kumar, PE	
	Mr Christopher W Kurkjian, PE	2005
	Mr Osmo Ensio Kuusisto	2010
	Mr Alfred Kwong	
	Mr Tim J Lehotsky	2011
	Mr Stephen Lahti	
	Mr David A Landsberg	
	Mr John W Lane	
	Mr Federico Sebastian Lang	2014
	Mr John Lanni, PE	
	Mr Jon Christopher Larry, P.E.	
	Mr Geoff Lawler	
	Mr Matt Lawrence	
	Mr Stuart Lawrence	2011
	Mr Christian Le	
	Mr Bret W Lehman	
	Mr Frank A Lembo	2008
	Ms Suzanne LeViseur, PE	2015
	Dr Hsing-Sheng Liang	
	Mr Mike Licitra	2011
	Mr Michael J Linde	
	Mr Damion John Lock	
	Mr Nemat Lotfi	
	Mr Lu Luna	
	Mr Chris Malanga, PE	2009
	Dr Christopher G Malone	2005
	William Maltz	
	Mr Alessandro Mandelli	2010
	Mr Francis Allen Marcelino Lumabas	2014
	Mr Lawrence C Markel	
	Mr Ted Marwitz	2013
	Miss Caroline Mason	2012
	Mr Ronald Norman Mays	
	Mr James P McAleer	
	Mr Timothy S McCann	2005
	Mr Greg McDonald	
	Mr Michael F McKenna	2011
	Mr Douglas K McLellan	2008
	Mr Godwyn Mendes	
	Mr Zuheir Mheir	
	Mr Francis A Mills	2007
	Mr Richie Mittal	2014

	Mr Michael Monahan	2010	
	Mr Mark Monroe	2013	
	Mr John Mouritsen		
	Mr John J Murgida		
	Mr John Musilli		
	Mr Sanjeev Nangia		
	Mr Ram Narayanamurthy		
	Mr Philip J Naughton	2011	
	Mr C.D Nayak		
	Mr David Michael Nesheiwat	2011	
	Mr John G Neubauer PE	2013	
	Mr Michael Nicolai		
	Prof George Agwu Nnanna	2008	
	Mr Budy D Notohardjono		
	Mr Rodney R Oehlers		
	Mr Mark Fraser Ogilvie	2011	
	Prof Michael M Ohadi, PhD	2012	
	Mr Guillermo Leon Orellana	2013	
	Mr Zarko Palavra		
	Mr Sanjay Panchbhaya		
	Mr Steven Parris		
	Mr Chandrakant D Patel		
	Dr Michael K Patterson, PhD	2005	
	Dr Andrew B Pearson, PhD, CEng		
	Mr Kenneth C Peet		
	Mr Craig H Petersen	2011	
	Mr John Peterson	2009	
	Mr Rahul M Phansalkar		
	Mr William T Pienta		
	Mr Andrew P Prandoni		
	Mr Joseph F Prisco		
	Mr Vidyasagar Puthran		
	Mr Honore'du Puy		
	Mr David S Redford	2014	
	Mr Mark N Reed		
	Dr Gamal Refai-Ahmed, PhD		
	Mr Charles W Rego		
	Mr William Reynolds		
	Mr Steven Rosenstock, PE		
	Mr Joel Rutledge, PE	2013	
	Mr Nestor Hugo Salinas, Sr		
	Mr Michael Salvatore		
	Mr Peter M Samain		
	Mr Michael Schwarz	2011	
	Mr Michael CA Schwedler		
	Mr Clifford M Scofield		
	Mr Ian Seaton	2010	
	Mr Darshit R Shah, Eng		
	Mr Anthony C Sharp		

	Prof Timothy A Shedd, PhD		
	Mr Saurabh K Shrivastava PhD	2011	
	Mr Thursten D Simonsen, PE,		
	Mr Mark J Simpson		
	Ms Shelby L Sims		
	Mr Satwinder P Singh, P. Eng	2012	
	Mr Grant Smith	2002	
	Ms Susan F Smith		
	Mr John Song	2013	
	Mr Marc A Soucy		
	Mr Ronald T Spangler	2013	
	Mr Jonathan C Spreeman	2010	
	Mr J F Stack	2005	
	Mr Jeffrey R Stein		
	Mr Benjamin L Steinberg		
	Mr Robin A Steinbrecher	2002	
	Mr Morgan J Stevens	2012	
	Mr Charles Bartlett Stewart, PE	2011	
	Mr Jeremiah Stikeleather	2011	
	Mr Robert F Sty, PE	2012	
	Dr Robert F Sullivan		
	Mr Abhishek Sundaram		
	Dr David Sundin	2013	
	Jacob Svenkeson		
	Mr Inn Tang, P.Eng		
	Mr Edwin Teoh	2012	
	Mr Jeff Tepler		
	Mr Ronald R Thomas, PE		
	Mr David C Tootle		
	Mrs Sengul Topuz	2012	
	Dr Robert M Tozer, PhD	2012	
	Mr Chad D Tramonte		
	Mr Sean G Treweek		
	Mr Jeff P Trower		
	Mr William Tschudi		
	Mr Michael R Vaughn PE		
	Mr Richard M Velten, PE		
	Mr Herb Villa	2007	
	Dr Aleksandar M Vukovic		
	Mr Henk C Waardenburg		
	Dr Ralph L Webb, PhD		
	Mr Andrew J Wengerd	2012	
	Mr Kurt Wetzal		
	Ms Katherine Whitenack		
	Mr Robert Wichert		
	Mr Jan Wiersma	2008	
	Mr Nick Wold		
	Mr Jackson Wong		
	Mr Larry Wong		
	Mr Tony S F Wong		

		Mr Stephen Woollard	
		Mr Lang Yuan	
		Dr Wangda Zuo	2014
PROVISIONAL CORRESPONDING MEMBERS			
Dr Satyam Bendapudi, PhD	2018	Mr Antonio De Jesus Aguayo	2018
Mr Chris Campbell	2016	Dr Husam A Alissa	2017
Mr Brad C Cochran	2017	Mr Samuel D Allen	2016
Mr Benjamin F Coe Jr	2018	Mr Mukul Anand	2016
Mr Benedict J Dolcich	2017	Mr Matthew R Archibald	2017
Mr Mark Fisher	2017	Mrs Serpil Ari	2017
Mr Charles F Freda	2017	Mr Adenilson Cristiano Belizário	2017
Mr Chris Hsieh		Mr Paul Bemis	2017
Mr Gary E Johnson, Jr	2017	Mr James E Bogart	2018
Elizabeth Langer	2017	Ms Holly Brink	2017
Mr Carl D Massey		Mr Douglas Brown	2018
Mr Ian C Nelson, PhD,	2017	Lance R Brown	2016
Dr Kourosch Nemati	2017	Mr Jerrod Buterbaugh	2017
Mr Casey Winkel	2016	Mr Andrew R Calder	2018
		Dr Sruti Chigullapalli	2017
		Dr Jinkyun Cho	2016
		Mr Bryce Cox	2018
		Mr Bryan Coyne	2018
		Mr Greg Crumpton	2017
		Peter Czerwinski	2016
		Miss Shelley Dangoor PE	2017
		Mr Jason A. Derrick	2016
		Mr Cuong H Dinh	2017
		Dr JIN DONG	2016
		Mr Christopher M Donovan	2016
		Mr Aaron A Duda	2017
		Ms Jacqueline Eaton, PE	2017
		Mr David Lee Edenburn	2017
		Mr Riccardo Degli Effetti	2016
		Dr Hamza Salih Erden	2018
		Mr Maxwell Evans	2017
		Sophia Flucker	2018
		Mr Clayton Foster	2017
		David Franczak	2017
		Dr Reza Ghias, PhD	2016
		Troy Goldschmidt	2017
		Scott Graf	2017
		Mr Shaun Green	2017
		Mr Robert F. Hewitt	2017
		Mr Steven Korey Hyde	2017
		Mr Hifumi Iguchi	2017
		Mr Julian Iosifescu	2017
		Miss Alekhya Kaianathbhatta	2017
		Abdullah Karimi	2016

	Mr Vijay Kasibhatla	2017
	Mr Rehan Khalid	2018
	Mr Srinivas Kodea	2018
	Mr Yuichi Kurihashi	2017
	Mr Yiu Wa Kwan	2017
	Mr Yuk Kuen Lam	2017
	Mr Allan Lee	2018
	Mr William Mak LEED AP BD+C	2017
	Mr Mark P. Malkin	2017
	Mr Christopher McDermott	2017
	Mr Jaakko McEvoy	2017
	Mr Michael E Meakins	2016
	Mr Brian W. Meneghan	2016
	Mr Michael L Miller, PE	2017
	Mr Chad E Moore, PE	2017
	Mr Zuokui Ning	2017
	Dr Sean C OHern	2017
	Mr Lawrence D Ollice, Jr	2016
	Mr Denis O'Mahony	2017
	Mr Christopher O'Reilley	2016
	Mr Andrew J Osborn	2016
	Dr Leslye Paniagua	2018
	Mr Farid Parsaei	2017
	Mr Thomas Peddle	2018
	Dr Tim Persoons	2018
	Mr Justin Mark Prosser	2017
	Miss Suhasini Pyarasani	2018
	Mr Prakash Rapolu	2017
	Dr Stuart Peter Redshaw, PhD	2017
	Mr David A Ritter	2016
	Mr Lance Ruetimann	2016
	Mr Ryan S Lime	2016
	Dr Hitoshi Sakamoto	2017
	Dr Ahmed H Abdel Salam	2017
	Ms Angela Sampaio	2018
	Mr Gary P Shamshoian	2016
	Mr Matt Loren Shumway	2017
	Mr Ruben Sidranski	2017
	Dr Prabjit Singh	2016
	Stuart Smith	2018
	Mr Marc A Sorge	2016
	Miss Kaiyu Sun	2017
	Mr David Vranish	2017
	Dr Aaron Wemhoff	2018
	Mr Stephen Lee Wren PE	2018
	Mr Yang Xiao	2016
	Mr Eric Yang, CPMP, HBDP, CEAP	2017
	Dr Yang Zou	2018
	Benjamin Zuk	2017

Tentative Meeting Agenda
TC 9.9
Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment
2018 Annual Meeting
Houston
Monday, June 25th 2:15 PM – 7:00 PM

TC9.9 Main Meeting – George R. Brown, 371 AB

Topic	Subtopic	Time	Presenter
Introduction	Welcome and around the room introductions	10	Jason Matteson
	Who is TC9.9	10	Jason Matteson
	TC9.9 Officers & Membership	10	Jason Matteson
Webmaster		5	Ecton English
Programs	Focus: Atlanta & Kansas City Conferences	10	Nick Gangemi
Liaison Reports	Standard 90.1	10	Rick Pavlack
	Standard 90.4 Review	10	Dave Kelley
	SPC-127	5	John Bean
	AHRI 1360	5	Dave Kelley
	Green Grid	10	Casey Winkle
	DMTF Redfish	5	Jason Matteson
	International	5	Don Beaty
Research	1675-RP : Guidance for CFD Modeling of Data Centers	5	Mark Seymour
	1755-RP : Impact of Gaseous Contamination and High Humidity on IT Equipment Corrosion	5	Dustin Demetriou
Marketing Subcommittee	Subcommittee Formation & Update	15	Paul Finch
	Break	15	
TC1.4	Guideline 38 : <i>High Efficiency Sequences of Operations for HVAC Systems</i>	25	TC1.4 rep
Industry Engagements	China Big Data Expo	5	Dustin Demetriou
Publications	Datacom Book #3: Design Considerations for Datacom Equipment Centers	15	Bob McFarlane
	Datacom Book #14: DCIM	15	Chris Lindberg
IT Subcommittee Reports		90	
	Liquid Cooling WhitePaper		Roger Schmidt
	HDD Whitepaper		Matt Shumway
	Cold Shipping Requirements		Joe Prisco
	Liquid Cooling in Colos		Dave Moss
	IEC/ASHRAE		Roger Schmidt
Executive Session -	Voting Members	TBD	Jason Matteson

Introduction – Jason Matteson

- Introductions
- Discussion of TC membership status and process
 - July 1st is the date when the roster is updated (Provisional to Corresponding member).
 - TC 9.9 is the largest technical committee
- ASHRAE & TC 9.9 Overview
- Review of ASHRAE Code of Ethics
 - Blogging on ASHRAE Letterhead is prohibited and has been an issue lately.
- Membership Update
 - 418 members
 - New marketing subcommittee chair – Paul Finch
 - Anyone that is provisional member for one year then they will become a Corresponding member due to the issues with managing the large TC.
 - Roster updates happen on July 1st.
 - Provisional Corresponding members drop off the roster after two

years of inaction.

- Currently 14 voting members.
- Losing 8 voting members and gaining 7 new ones.
- TC needs approximately 12 voting members with a minimum of 6 max of 18.
- Voting members are appointed by the chair.
- Minimum of four or exceeds half of voting members then there is a quorum.
- Discussion of the number of voting members for a large TC.
- How to sign up for assisting with the HVAC Applications Chapter 19
- Latest TC Activities link added to TC 9.9 website
- Membership levels and explanation of Corresponding and Provisional Corresponding Members
- Voting member discussion

Handbook Chapter Update – Bob McFarlane

- TC 9.9 is responsible for Chapter 19 of the HVAC Applications Handbook
- Out-of-sequence update was delayed due to issues with ASHRAE bureaucracy.
- Out-of-sequence updates being applied the day of the meeting to print version.
- We were advised that further updates could not be done until the out-of-sequence updates were applied and the delay has caused a need for extensions to the in-sequence updates.
- We have until the end of July and probably until August 15 and maybe longer.
- Updates are done through the new ASHRAE authoring portal
 - Portal is Internet Explorer compatible only. Other browsers are not compatible.
 - authoring.ashrae.org
- List of items to be reviewed and updated as necessary.
- List generated by Bob and four other people.
- Looking for members to sign up to topic to update and sign-up sheet with list of topics circulated.

Webmaster – Ecton English

- Tc0909.ashraetcs.org
- Work items are listed on website.

Programs – Nick Gangemi

- Presentation available on the website.
- Statistics on submittals and approvals presented
- Deadlines for future conferences reviewed (Atlanta).
- Atlanta Tracks reviewed
 - Stay away from 1,2 & 3.
 - Tracks 4,5 & 6 recommended for TC9.9
- Conference paper abstracts 8/21 and due 11/30.
- Nick can be reached at 585-509-5746.

Liaison Reports

- Standard 90.1 – Rick Pavlak
 - Addendum CZ - Statement clarifying 90.1 & 90.4 jurisdiction on data centers did not get voted out of committee (18 for, 9 against, 9 abstentions).
 - There will be another vote on Addendum CZ in Atlanta.
 - Addendum CZ will be going out for a letter ballot but these historically get voted down.
 - Member of the standards committee will attempt to resolve.
 - ASHRAE headquarters is not happy and it will be resolved.
- Standard 90.4 Review – Dave Kelley
 - 7x24 Exchange October national meeting presentation scheduled
 - Working on getting into the ICC national meeting in the Fall.
 - Presentation to be put on the tc99 website.
 - Encourage members to present to their local groups.
 - USGBC presentation for them to include in their literature.
 - Several addendums to the standard have gone out for public review.
 - New version will go out in 2019.
 - New push to get adoption at the state level.
- AHRI 1360 – Dave Kelley
 - New numbers for ceiling units submitted to 90.1 and approved on Sunday thru the mechanical subcommittee. Needs full committee.
 - DOE still not very happy with the tables.
 - Four member companies, now six. AirSys Refrigeration (Chinese company) and AboveAir Technologies were added.
 - DOE issues with floor mounted unit numbers. Can't compare apples to apples (old versus new) as the rating system changed and therefore some numbers have an appearance of backsliding. Rated at 80F return air temperature instead of 75F old.
 - DOE cannot legally comment on the new numbers because they missed the 18 month deadline.

- SPC-127 – John Bean
 - Method of Test for Air conditioning serving data centers and information technology spaces.
 - Latest revision will broaden the list of technologies for cooling data centers.
 - Recognizes the existence of AHRI 1360.
 - There has been lots of public response
 - Handfull of comments to be handled before second draft for public review
 - Asked to include the definition of data center in this document.
 - Now standards 90.1, 90.4 and SPC-127 will each have a definition of data center.
 - SPC-127 will try to anticipate where the definition will eventually land with their definition.
 - Minor errors and diagram updates
 - How to include method of test for really large outdoor systems and make it practical.
 - Letter ballot and then 2nd public review by this summer.
 - Rear door heat exchangers and pumped refrigerant systems included.
 - Addendum BE new performance table out for public review.
 - Floor mounted and ceiling mounted cooling units are included.
- Green Grid – Casey Winkle and Mark Seymour
 - Highlight of the Projects going on at Green Grid:
 - New Metric - Infrastructure Utility Effectiveness
 - Power Metrics for ITE white paper published 6 months ago addresses the gap between PUE and productivity.
 - Liquid Cooling – Introduction to CDUs whitepaper to be published in the next few weeks.
 - General liquid cooling technology update available to GG members
 - Liquid cooling TCO tool on website available to GG members.
 - Open Standard for Data Center Availability Tool - Modernize availability classifications for data centers.
 - Data center automation with a DCIM system whitepaper.
 - Redfish API Utilization.
 - Harmonization Workgroup focused on open specification on liquid cooling. Goal is to make it more cost efficient to deploy liquid cooling by commoditizing a lot of components.
 - Open spec for non-prop multi-vendor for warm liquid cooled servers compatible with existing open rack standards.

- Datacenters.lbl.gov/industry-driving-harmonization-international-data
- DMTF Redfish – Jason Matteson substituting for Chris Lindberg
 - Open industry standard schema
 - Makes it easier to interface with equipment across the data center industry.
 - There are different tiers of compliance.
 - Scope is best defined as encompassing “chip to chiller”.
 - Book three will cover DCIM compliance.
- International – Jason Matteson substituting for Don Beaty
 - Steve Comstock who we communicate with for publications is a big advocate for our publications.

Research

- 1675-RP: Guidance for CFD Modeling of Data Centers – Mark Seymour
 - Intended to provide independent guidance on modeling.
 - Georgia Tech will be subcontracted to utilize their lab thru Florida International University.
 - No cost extension made to finish by next March.
 - Prototype for the server simulator has been received.
 - Preliminary simulation work has been done to model the GT lab.
- 1755-RP: Impact of Gaseous Contamination and High Humidity on IT Equipment Corrosion – Dustin Demetriou
 - No cost Extension to December 31 from June 30.
 - Voltage bias testing as well
 - Fluctuation of humidity effects
 - Looking for actual data from operational data center on humidity fluctuation
 - Question was asked as to whether dewpoint or RH was used? RH was used.
 - TC2.3 requested the testing on variability
- No new research from our group and funding is available from ASHRAE

Marketing Subcommittee – Paul Finch

- Market subcommittee has been attempted with limited success for the last couple of years.
- Don Beaty will have someone from his team join the subcommittee to support.
- Develop an official TC 9.9 LinkedIn site.
- Aim for one post a month.
- The site provides analytics about visitors.

TC1.4 – Marcelo Acosta (TC 1.4 Chair)

- Seeking to collaborate on Guideline 36 High efficiency sequences of operation.
- Offer specifications for state-of-the-art systems and sequence of operations.
- Hoping to help tackle energy efficiency but promoting greater adoption of state-of-the-art technologies by standardizing sequences of operation.
- Guideline 36 for High Performance Sequence of Operations has been published and is available in the ASHRAE bookstore.
- Guideline 36 lacks standard system designs to go along with the Sequences of Operations.
- Develop part load simulation software and require modules manufacturers to provide the data required by the software.
- Provide baseline detailed and thoroughly tested designs for subsystems in modular packages.
- Marcelo received mixed reaction from the audience.

Industry Engagements – Dustin Demetriou

- Chinese Association of Refrigeration
 - 30 year relationship with ASHRAE
 - China International Big Data Expo
 - Annual meeting in May.
 - 2010 committee in China got the copyright to Datacom books and translated into Chinese.
 - Datacom books highly used in the data center industry and they are highly regarded.
 - High Density book is the number one best-seller of the bunch.
 - The Chinese books are out of date and need to be updated.
 - Owners don't care about the guidelines and care more about certification.
 - Opportunities for utilizing 90.4 and spreading its adoption.
 - BIM is widely adopted in construction and operation of data centers in China.

Publications

- Datacom Book #3: Design Considerations for Datacom Equipment Centers – Bob McFarlane
 - Undergoing an update for a year.
 - Initial edits are complete.

- Many peer reviews are complete.
- Many final edits are read for Roger to review.
- There are a few chapters with no Lead volunteer – initial leads had to drop out due to various reasons.
- Mark Fisher volunteered for chapter 14 on energy efficiency.
- Acoustics has been completely rewritten.
- Larry doesn't have the resources to push forward so Bob and Roger are stepping up.
- All edits are available on the server.
- Need leads for contamination and Fire Detection & Suppression. Both have been edited and review but still need a lead for the final push.
- Should be finished before Atlanta meeting.
- Some chapters need to go through peer review again because initial review had comments that required revision.
- Datacom Book #14: DCIM – Dustin Demetriou substituting for Chris Lindberg
 - Last report was there was a bunch of chapters that needed revision and last week they were finished.
 - Six chapters in the book.
 - Chris Lindberg - not here due to flight delay
 - Content is ready for review.
 - 129 pages of content.

IT Subcommittee

- Water Cooling Whitepaper – Roger Schmidt
 - Met with the working group this morning.
 - Whitepaper is 80% complete.
 - Expected finish by Mid-August
 - 35 Pages in the whitepaper.
 - IEC is requiring a pressure test 5X operating which we are hoping to reduce.
 - Will not cover immersion liquid cooling. Currently there are a couple of chapters on the subject but they will be removed.
 - Not looking to duplicate what is already out there. Might end up being integrated into the Liquid Cooling book.
 - This whitepaper does not look at liquids other than water.
 - Future whitepapers will cover different liquids/fluids.
- IEC/ASHRAE – Roger Schmidt
 - Harmonization of cable/connectors/appliance coupler temperature standard w/server operation environments - Roger

- Concerned about ASHRAE definition of ambient temperature.
- ASHRAE defines ambient as what enters the server. Others see ambient as the temperature near the component. Same components may be used in our servers.
- Conference in Toronto.
- Our temperatures are much higher and we de-rate the connectors for that environment. Not sure there is an industry standard to de-rate.
- First meeting took place a week before Houston conference.
- UL approves the use of de-rating of components.
- Cold Shipping Requirements – Joe Prisco
 - No real update.
 - Target finish date of January 2019
 - There is another TC that focuses on cold shipment that would like to work on this with us.
 - Draft of the whitepaper exists but needs a lot more work.
- Liquid Cooling in Co-Lo's – Dave Moss
 - No progress.
 - Dave will be working on this in this cycle.
 - Asking for volunteers to help work on the whitepaper.
- HDD Whitepaper – Matt Shumway (not present) / Casey Winkle
 - Fan speed increases due to higher temperatures which makes PUE look better.
 - Hard drives face performance loss because of higher temperatures.
 - Addresses the acoustical impact of higher fan speeds on hard drives.
 - Details the impact of gas fire suppression acoustical discharges on hard drives.
 - Larger numbers of hard drives in servers are also causing an impact on performance.
 - CPU and hard drive power consumption continues to go up.
 - TCO portion is still in progress.
 - Matt is asking for more volunteers for reviews.
 - White Paper due to be complete end of August 2018.

Executive Session – Jason Matteson

- Not Held