AMERICAN SOCIETY OF HEATING REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.

TC/TG/TRG NO: **TC 9.9** Date: **January 27, 2013** Location: **Dallas, Texas, USA**

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

VOTING MEMBERS	YEAR APPTD	PRESENT ABSENT	VOTING MEMBERS	YEAR APPTD	PRESENT ABSENT
John Bean	10	P	David Moss	11	P
Don Beaty , Publications/International Subcommittee Chair	10	P	David Quirk , Chair	09	P
Chris Kurkjian	11	P	Terry Rodgers	09	P
Ecton English, Webmaster	10	P	Roger Schmidt , IT Subcommittee chair	09	P
Joseph Gangemi , Programs Sub Chair	11	P	Robin Steinbrecher-Vice Chair	10	P
Jack Glass	09	P	Herb Villa	10	P
Rhonda Johnson	10	A			
Greg Jeffers- Secretary	12	P			
Mukesh Khattar	10	A			
Francis Mills- Int'l	09	P			
Corresponding Members and all attendees-see below list		See Below			

All Members of TC/TG/MTG/TRG plus the following:	
TAC Section Head:	Tom Lawrence
TAC Chair:	Charles Culp
All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters:	
Manager Of Standards	Stephanie Reiniche
Manager Of Research & Technical Services	Mike Vaughn

Monday Jan 28th, 2013 Meeting	First	Last	(V)oting member (C)orresponding member (P)rovisional Corresponding member Member-ASHRAE General (G)uest
X	Gerardo	Alfonso	Member
X	Jim	Bailey	Ashrae
X	Andrew	Baxter	C
X	John	Bean	V
X	Don	Beaty	V
X	Eric	Carter	P
	Herman	Chu	G
X	David	Claridge	
X	Benjamin	Cohen	
X	Lex	Coors	C
	David	Copeland	C
X	Craig	Crader	C
	Charlie	Culp	G-ASHRAE TAC Chair
X	Tom	Davidson	C
X	Nick	DesChamps	G
X	Gene	Dimond	Ashrae
X	Keith	Dunnavant	G
	Rick	Eiland	G
X	Derek	Elliott	Student

X	Ecton	English	V
X	Bert	Etherege	G- ASHRAE
X	Paul	Finch	G
X	Mark	Fisher	G
X	Jon	Fitch	G
X	Mary	Foutz	G
X	Nick	Gangemi	V
X	Tift	Gannon	G
X	David	Garcia	Member
	Don	George	G
X	Mark	Germagian	C
X	Reza	Ghias	Member
	Art	Giesler	C
	Ken	Gill	G
X	Jack	Glass	V
X	Hiroyuki	Hmurayama	G
X	Dave	Hoyt	Non TC9.9
	Kevin	Huges	P
	Madhu	Iyengar	C
X	Ted	Jagusliyn	P
X	Ted	Jagusztyn	P
X	Greg	Jeffers	V
X	Randi	Johnson	
X	Fitch	Jon	Member
	Mike	Kaler	P
X	Raj	Kapoor	C
X	Daniel	Kennedy	P
X	Daniel	Kennedy	Member
X	Matt	Kouki	P
X	Paul	Kozlov	O
X	Eric	Kumar	P
	Chris	Kurkjian	V
X	Geoff	Lawler	C
X	Stuart	Lawrence	C
X	Sang	Lee	C
X	Nemaj	Lotfi	C
X	Carol	Marriott	G
	Caroline	Mason	G
X	Jason	Matteson	G

X	Bob	McFarlane	C
	Jacque	McIlrath	G
	Michael	McKenna	G
	Doug	McLellan	C
	Bill	McQuade	G- TAC V Chair ASHRAE
	David	Meadows	V
X	Frank	Mills	International
X	Mark	Monroe	G
X	Kosu	Morishima	
X	David	Moss	V
X	Chris	Muller	C
	Al	Nichols	G
X	Mike	Ohadi	C
	Mike	Patterson	C
X	Rick	Pavlak	V
X	Gabriel	Peters	O
	John	Peterson	C
X	David	Quirk	V
X	Nirmal	Ram	
X	Nathan	Redmann	
	Stephanie	Reniche	G- ASHRAE Staff
X	Terry	Rodgers	V
	Eddie	Rodrigues	G
X	Edgar	Rovillos	G
X	Joel	Rutledge	P
X	Jeff	Rutt	V
X	Shiro	Sakoo	International
X	Roger	Schmidt	V
	David	Schowalter	G
	Mike	Scofield	C
	Ian	Seaton	C
X	Justin	Seter	G
X	Mark	Seymor	C
X	PJ	Singh	C
	Vali	Sorell	C
X	Row	Spangler	G
X	Tom	Squillo	G
X	Robin	Steinbrecher	V
X	Peter	Strapp	Ashrae
	Dave	Swenson	G

	Geri	Swenson	G
X	Makoto	Takahashi	Member
X	Yuichi	Takemasa	G
X	Ryuji	Tanagihara	G
X	Robert	Tozer	P
	Jeff	Trower	V
	Bill	Tschudi	C
X	Edward	Tsui	Member
	Marianna	Vallego	G
X	Herb	Villa	V
X	Marlin	Vogel	G
X	Michael	Woodford	G
X	Susumu	Yoneoka	G

General Meeting on January 28, 2013 - Call to order

Chairman, David Quirk called the meeting to order at 2:15 p.m. A quorum (14 of 16) voting members were present.

Committee voted to adopt past Summer Meeting minutes and 2 interim phone call meeting minutes- Vote pasted 14-0-2.

Introduction

Everyone in the room announced their names and affiliation. (over the course of the meeting however the attendance swelled and over half of the people were not introduced. David gave a presentation on TC9.9 – overview and how to get involved. Ppt to be posted on the TC9.9 website for reference.

Programs Update Nick Gangemi

Reviewed programs from San Antonio. Only 50% acceptance rate; getting more competition on sessions. Growing number of conference paper submissions again this year. Go to ASHRAE website for submission for New York.

Upcoming summer conference at the Denver Sheraton

New York 2014 Conference Update

This conference has a building-oriented theme and seeks papers on building information systems; environmental health; international design; HVAC&R applications and systems; and,

featured for this conference, tall building performance.

Future Conferences

Winter 2014 – New York, New York; Jan. 18 – 22

Annual 2014 – Seattle, Wash; June 28 – July 2

Winter 2015 – Chicago, Illinois; Jan. 24 – 28

Annual 2015 – Atlanta, Georgia; June 27 – July 1

2:15 p.m. Opening and Introductions David Quirk TC9.9 Overview

Discussed some old business. First International member 1895 (per Don Beaty). Bob McFarlane still looking for members to help him with handbook chapter.
Jack glass states roster update during winter meeting keep BIO and email updated on ASHRAE's webpage.

Liaison Reports

Standard 90.1 liaison- Rick Pavlak

90.1- 2013 edition will be published this year

One addendum change required on the design point of cooling towers for 35 degree. Selection for 100% capacity is not possible. Majority of current designs use 25 degrees. Out for public review and public comment.

Another addendum changes table 6.8.1.k and uses update standard SPC 127. Make sure it is reviewed during public review. CRAC manufacturers should review closely.

Addendum for Data Center definitions are out for comment and is important to divide the demarcation line on applications. TC9.9 will provide input for guidance and background to submit comments for public advisory addendum that closes on February 4th.

Standard 90.4 P - David Quirk

Had 2 meetings already in Dallas. New definitions in addendum out for advisory review attempt to provide demarcation and pull DC out of 90.1. Currently 90.1 has no alternative compliance path and was recently rejected by 90.1. Initial public review as early as Denver, 2 year max planned.

SPC-127 - John Bean

Method of test for rating computer room air conditioners. Table released to change return

rating methods. DOE picked it up in 2012 May, but they used the 2007 version. Associated 90.1 Table was not vetted completely and table has been picked up and the values need to be changed. ARI DataCom section may come up with new recommended table. Purpose should be the minimum should not be pushed out to state of the art. 2012 table is not vetted. End goal is to have AHRI standard certified.

Website Update ***Ecton English***

1000 downloads of the thermal guidelines. Paper needs to be pulled from the website because the third edition of the Thermal Guidelines is in print.

ANSI EESCC ***David Quirk***

Energy Efficiency Standardization Coordination Collaboration Standard organization for standards organization. They do not write standards but comment on others. Have 5 working groups including WG1 Building Energy and water use group. Stefanie Reiniche of ASHRAE staff is a co-chair of one of the groups.

www.ansi.org/eesc/

International ***Don Beaty***

Presented at various meetings abroad

Working on joint book with The Green Grid on PUE

Memberships ***Jack Glass***

More than one path to become a member of the TC which leads to some confusion

262 members – 54 provisional corresponding members

Roster becomes effective July 1st at which time you become a corresponding member

Bio must be updated by the individual – if email becomes obsolete, notification will no longer occur – go to the main ASHRAE website for this

Let Jack or Dave Q know if anyone is no longer engaging in TC99

It's not necessary to be a member of ASHRAE to become a TC member

Program Subcommittee and Future Topics ***Nick Giagamgi***

7 tracks for NYC

ASHRAE has been inundated by seminars. 90% of Seminars batting about 50%, other TC's around 35%

Denver- Seminar/forum submitted Feb 11th

New York- Next winter meeting

Future Programs- more technical in past and case studies are usually very popular.

Annual 2014-Seattle, Washington.

Publications Subcommittee Report Don Beaty

TC 9.9 averages 1 book a year and have been updating 6 books, 3 in the works, 1 PUE book with Green Grid out by Q2, working on network and storage and economizer books.

Industry Coordination & IT Sub committee Reports

National Science Foundation Roger Schmidt IBM Fellow

I/UCRC (Industry/University Cooperative Research Center)

NSF – industry/university cooperative research center – projects guided by the member companies which drive the NSF research, 12 funded projects for a total of $600k at the four universities – example – air side economizers with evaporative cooling, thermodynamic model from chip to tower.

I/URCRCNSF has 61 national centers and they seed these centers to develop new technoilogies. 760 member companies ES2 is an NSF cooperative research Center Birmingham, UNV Texas at Arlington, Ga Tech, Villanova University. This effort enhances relationships with business .

Sample project -Villanova All Ortega- A chip to cooling Tower Thermodynamic System Simulator. Near Beta Testing at this point.

Sample Project on Particulate gases- University at Texas Arlington-12 projects, 20 companies. One of the hosts schools for NSF- University of Texas- Arlington. 5 year technology roadmap.

Research infrastructures at Arlington. They have a booth at the ARI show. Latest work involves donation of 250 servers from yahoo. They need some racks donated for this effort.

EU Code of Conduct (minutes from London meeting)- Rodger Schmidt- IBM Fellow

EU COC Best Practices for Data Centers were in sync with class A3 and A4 of TC 9.9 guidelines top of varying temp and long term thermal cycling.

IT needs to look at IT temperature and IT humidity cycling. Need some sort of X factor for humidity; under review.

Thermal report more detailed than Energy star input.

Concerns- Allowable range was not well supported by vendors for information. Some concern and some vendors said no problem 27 C max is recommended, but allowable (blue box) is what equipment is tested to.

Explain to user to go to top end of recommended. Need to explain the consequences through the x factors.

Go to 9.9 Datcom book series especially appendices for info.

EPEAT Request ***Robin Steinbrecher***

Green Electronics council- In business for 10 years, is now impacting servers, typically affected packaging in the past. Requires CLASS 4 compliance for EPEAT cert. (big change from no certification) EPEAT is part of FAR- Any federal acquisition is required to be done. ITE whitepaper on website; server thermal design basics in most servers, how servers work including fans speed controls. Paper will eventually discuss fan delta P for servers, and server delta T, chip power leakage losses, power consumption, so larger the temperature higher leakage losses, primarily with server silicon.

Research updates

Contamination Update ***P J Singh***

Field contamination study review. X factor of RH discussed.

2 organizations Battelle for 40 years and lately Sandinista labs

Old research from 1985 from Battelle was discussed.

Cu is affected by humidity much more than silver Corrosion of copper is a step function

Salt content tan changes much more humidity, but silver is a step. Above 40% silver starts to corrode in salt environment AG Cl corrosion product.

Humidity fluctuation is one of the most important factor, appear to be a powerful influence. X factor is still a challenge. The cycling of humidity is the main concern and above 60 percent is then very important.

Corrosion conclusions

- Variability of humidity level lowers the level at which corrosion occurs
- Above 60% RH – corrosion rates are low, below 60% corrosion rates are high
- RH vs. failure rate – more like a step function

RTAR-1675 ***Jim VanGilder / Mark Mark Seymour***

Jim gave an update on the RP and RTAR. RAC returned with a request for more details. 9.9 voted to approve. RAC has returned it again with the same comments. They want more detail.

Mark provided more detail on the submittal and what type of results they are looking to get as a result of the research. Choices made during the modeling phase may be incorrect based on the user's opinion on what is necessary.

Energy Modeling Work Statement ***Tom Davidson***

Tom Davidson summarized research with TC 4.7 new work needs to be done in a month to determine scope for CFD research.

FORUM (ADVANCED)

Improving Data Center Efficiency with a Better Match of HVAC and IT Systems

Track: HVAC&R Systems & Equipment

Room: D1 Dallas

Sponsor: 09.09 Mission Critical Facilities, Technology Spaces and Electronic Equipment

Chair: David Moss, Dell, Inc, Austin, TX

OPEN SESSION: no badge required; no PDHs awarded; presented during the TC's meeting. Data center efficiency improves with a higher operating temperature and a better volumetric match between HVAC and IT systems. This three part presentation will explore volumetric flowrate and delta-T trends for IT systems, temperature limitations for IT systems (primarily in network switch equipment), and methods of volumetric control for different containment solutions.

Learning Objectives: 1. Understand current and future flow rate trends for IT equipment which will enable better planning for HVAC. 2. Understand current and future delta-T trends in IT equipment 3. Understand how delta-T trends will effect other rack equipment such as network switches. 4. Describe some of the mitigation techniques/products currently used to adequately cool network switches. 5. Understand the strength and/or limitation of IT systems within passive containment solutions. 6. Explore different methods for HVAC volumetric control with the goal of matching IT consumption.

Server Interaction in the Data Center; A Discussion On Delta T Trends and Effects of External Pressure

Katie L. Pizzolato[1] *and* ***Arden L. Moore, Ph.D.***[1]*, (1)IBM, Austin, TX*

As increasing density and containment serves to couple data center equipment much more closely, there is a need for increased understanding of how the thermal characteristics of individual IT components affect the overall thermal performance of the integrated IT solution. This seminar will discuss temperature rise (delta-T) trends across systems, a variable which is having an increasing impact on rear mounted rack equipment. We will also look at data associated with helping and hindering external pressure applied to servers with the goal being how better to use the servers within tightly coupled passive containment solutions.

Thermal Guidelines and Best Practices for It Networking Equipment

Jon Fitch, Ph.D., Member*, Dell, Round Rock, TX*

Networking equipment is a critical part of the IT infrastructure needed to interconnect a data center, a telecom office, an office, and even manufacturing facilities. Networking equipment is unique because the cooling air flow direction is not standardized (some side to side, some front to back) and the usage environments where networking equipment is needed can be thermally challenging. This presentation will give thermal guidelines and best practices installing and cooling network IT equipment to overcome these hurdles. These recommendations were authored by a cross-company team of subject matter experts from leading network IT equipment manufacturers.

Methods of Volumetric Control within Containment Systems

David Moss*, Dell, Inc, Austin, TX*

Data center containment solutions provide isolation of delivered or return air. They can be aisle or rack based, passive or active, and can form a tight or loose coupling between HVAC and IT equipment racks. After looking at methods used for volumetric control in loose containment systems, the presentation will concentrate on tight containment with pressure control between the IT racks and air handlers. The presentation will then deeply into pressure related flow rate and resulting power level of the IT systems. It will present evidence that lower pressures not only save energy but will also reduce unwanted bypass.

Methods of Volumetric Control within Containment Systems

Dave Moss-

Thermal Guidelines and Best Practices for It Networking Equipment

John Fitch with Dell

Highlights

Whitepaper with 19 persons with 6 leading IT companies

Networking equipment potential weakest link for temperature ratings

Data center networking also has a decent portion of Telecom equipment but are different where they draw air. Similar to Telecordia GR-63 recommendations Consider use of plastic materials in hot aisle touch zones Recommend front to rear airflow. Convert side to side switches to front to rear (Cisco, Juniper, Fuzitsu, Dell, AP)

FORUM (INTERMEDIATE)

CFD Modeling, Control Scheme Efficiency & IT Ride through for Cold Aisle Containment

Track: HVAC Fundamentals and Applications

Room: D1 Dallas

Sponsor: 09.09 Mission Critical Facilities, Technology Spaces and Electronic Equipment

Chair: Nick Gangemi, Member, Facility Gateway Construction, Madison, WI

OPEN SESSION: no badge required; no PDHs awarded; presented during the TC's meeting. In order to adequately cool modern IT Equipment cabinets in an energy efficient manner, previous ASHRAE presenters haverecommended the use of CFD analysis, containment of the hot / cold aisles, raising cold aisle temperature set points, and using control schemes that decouple the airflow and capacity control loops from each other. This work presentsa combination of data center lab testing and CFD modeling intended to address these issues. An additional study presents the thermal transient data for a series of tests conducted at a data center lab, with intent to simulate a IT ridethrough

Learning Objectives: 1. Explain the importance of including various leakage factors, IT load device characteristics and CRAC unit characteristics when modeling cold aisle containment with CFD. 2. Through physical testing, quantify the energy benefits of higher cold aisle temperature set points when cooling with a CRAC unit and coldaisle containment. 3. Through physical testing, quantify the energy benefits of decoupled control schemes versus coupled control schemes when cooling with a CRAC unit and cold aisle containment. 4. Show the impact of cold aisle containment on the ride-through time of a data center during cooling equipment failure and how it compares to open aisle configuration. 5. Through physical testing, quantify the ride-through time for different IT loads and different cooling equipment set-points. 6. Develop and calibrate both a CFD model and a thermodynamic based transient tool to accurately predict the ride-through time of a data center during a cooling equipment failure cooling system failure. The results reveal an interesting phenomenon that puts Cold Aisle Containment at an advantage over open hot aisle / cold aisle configurations.

Saurabh Shrivastava, PHD Lead thermal engineer with Panduit

Seminar Presentation – Waterside Economizers, cooling tower sizing and freezing issues

Frank Morrison & Paul Lindah

Concerns for cold tower water operation. Requires a heat load to operate in the winter.

Do not operate unattended. Requires extensive visual monitoring several times a day during cold weather and may require removal of grills to verify ice build up. Staff needs to be totally involved with it. Must maintain minimum GPM design Minimum over the fill.

Manufacturer's minimum must be retained (sometimes isolate cells). Manipulate airflow to match temperatures. Once a shift operation with remote cameras recommended

2 speed motors can cause cell overcooling. Counter flow towers ice on the inside, cross flow towers ice on the outside. Reverse fans at no more than 30% of full speed and water can create icing tower around it. Requires vibration isolation on fans and build up fans on ice.

Question with operating systems below 42 deg F supply was deferred.

8:15 p.m. Membership Review and Wrap-up ***David Quirk***

8:30 p.m. Public meeting Adjourned

Meeting Minutes prepared by Greg Jeffers