

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.
1791 Tullie Circle, N.E./Atlanta, GA 30329
404-636-8400

TC/TG/TRG MINUTES COVER SHEET

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

TC/TG/TRG NO.: TC 4.1 DATE: December 2, 2016

TC/TG/TRG TITLE: LOAD CALCULATION DATA AND PROCEDURES

DATE OF MEETING: June 27, 2016 LOCATION: St. Louis, MO

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Voting Jim Pegues Steve Bruning Som Shrestha Larry Sun Bob Doeffinger Chris Wilkins Glenn Friedman Rolando Legarreta Jeff Spitler Non-Voting Chip Barnaby Suzanne LeViseur Stephen Roth Russell Taylor		Voting Non-Voting Lucy Amankwah David Ariyo Fred Bauman Alireza Behfar Andrew Braum Sonia Brown Jui-Chen Roger Chang Charlie Curcija Christopher Delgado Philip Farese Dove Feng Joe Ferdelman Daniel Fisher Douglas Hittle Stephen Kavanaugh Ken-Ichi Kimura Elyse Malherek Bryan Morris Gabrielle Powell Ghani Ramdani Brian Rock Ahmad Sleiti Laura Southard Branko Todorovic Gary Wingfield Justin Wong Kevin Wood Ke Xu		Visitors Christian Bach Rachel Spitler Dennis Wessel David Yuill

DISTRIBUTION:

All Members of TC/TG/TRG

ADDITIONAL DISTRIBUTION:

TAC Chairman:	<u>Dr. Thomas Lawrence</u>
TAC Section Head:	<u>Dennis Wessel, P.E.</u>
Research Liaison:	<u>Prof. Xudong Yang</u>
ALI/PDC:	<u>Cameron R. Labunski, P.E.</u>
2017 HOF:	<u>David P. Yuill, P.E.</u>
Standard Liaison:	<u>James Dale Aswegan</u>
Manager of Standards:	<u>Stephanie Reiniche</u>
Staff Liaison:	<u>Michael R. Vaughn</u>

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

Draft Unapproved Minutes

June 27, 2016
Committee Meeting Minutes
TC 4.1 Load Calculations Data and Procedures
St. Louis, MO

1. Meeting called to order by Jim Pegues.
2. Roll Call – Secretary Sun
 - a. 9 of 9 voting members present.
3. Introductions
 - a. Jim Pegues called for anyone interested in becoming corresponding member to please indicate on sign in sheet.
4. Quorum present.
 - a. Motion to approve Orlando minutes as submitted: Steve Bruning
 - i. Second: Rolando Legoretta
 - ii. Vote 8-0-0 CNV
5. Liaison Reports
 - a. Dennis Wessel, Section Head
 - i. Dennis suggested reviewing his notes presented at the TC Chairs breakfast. See attached TC section breakfast handout.
 - ii. There is a new multidisciplinary task group (MTG) on air change rates called MTG-ACR
 - iii. TAC just approved new TC MOP with updates
 - iv. Dennis has prepared a summary from TC chair breakfast (see attached). This has information on roster upload.
 - v. Remote webinars can be set up for TC meetings. This can be coordinated w/ Mike Vaughn
 - vi. A webinar can also be set up through ASHRAE prior to meetings for general business
 - vii. CTTC & TC 1.7 presentations on ethics for PE registration may be of interest

- viii. Dennis encouraged staying in touch with corresponding members and “probationary” members who sign up online. They will drop off in 2 years.
 - ix. Please try to complete meeting minutes 60 days after meeting
 - b. David P. Yuill, Handbook Liaison
 - i. Thanks very much for hard work especially Steve Bruning.
 - ii. New handbook authoring tool portal will be online soon and will allow ongoing updates to chapter. This is not mandatory but hopefully helps make handbook chapter updates easier.
- 6. Research Subcommittee – Chris Wilkins
 - a. Reviewed all projects at subcommittee. See attached handout for Research Subcommittee meeting minutes.
 - b. RP-1742 “Updates to Measurement of Office Equipment Heat Gain Data”
 - i. Friedman is chair and reported that protocols are set up and some adjustments will be made including the following:
 - 1. Data for HOF chapter updates earlier in process
 - 2. No radiant/coactive split this time but more in line with Standard 203 for heat gain over a period of time and various modes of operation.
 - 3. Include specific “mode” tests (sleep etc.)
 - c. RP 1681 – “Low Energy LED Lighting Heat Gain”
 - i. Primary investigator is Iowa Energy Center
 - ii. 17 lights tested with very good results aligning with HOF table
 - iii. Bruning asked for w/SF comparisons between LED vs Fluorescent
 - iv. PI has agreed to journal article with Friedman for professional engineering input
 - v. 2 transaction reports and program will be included

- vi. Motion to approve Doeffinger
Second: Bruning
Vote: 8-0-0 CNV
- d. TRP 1729 – Experimental Verification of Cooling Load Calculations for Non Uniform Radiant Surfaces.
 - i. PES met and will make a recommendation in executive session
 - ii. Four very good submissions. All below budget
- 7. Programs/Standards Subcommittee Report – Glenn Friedman
 - a. See attached handout for Programs/Standards Subcommittee Meeting Minutes
 - b. Programs at this meeting:
 - i. Seminar 23 Load Calculations – Parting the Clouds to see the Future of Residential Load Calculations was a success with 50 attendees. Many thought provoking ideas moving forward such as using HB method to determine zone temperature impacts in undersized conditions, and zoning sensitivity.
 - c. Future Programs
 - i. Las Vegas: BIM to Load Updates – similar to previous BIM to Load presentations. Use ASHRAE building example in Revit, Bentley and GBXML, and compare results and worthiness for actual use.
Motion: Friedman
Second: Legaretta
Vote: 8-0-0 CNV
 - ii. Las Vegas: Supporting TC 4.2 in program for Impacts of Updated Weather Data in HOF
Motion: Friedman
Second: Shrestha
Vote: 8-0-0 CNV
 - iii. Long Beach:
 - 1. RP 1681 Seminar presentations. Two abstracts already presented by researchers. Another presentation by Friedman on New Construction vs Renovation Lighting Applications
Motion: Friedman
Second: Wilkins
Vote: 8-0-0 CNV

2. RP 1742 Updates to Plug Loads two presenters to correlate with HOF. Co-Sponsoring RP-1631 Kitchen Loads could add in as a 3rd presentation. Legaretta will look into this.

Motion: Friedman

Second: Bruning

Vote: 8-0-0 CNV

8. Standards

- a. No new standards at this time
- b. Standards SPC-203 Method of Test for Determining Heat Gain of Office Equipment is being referenced in RP-1742.
- c. Please let the TC know if anyone sees Standard 203 being applied by someone

9. Handbook Subcommittee – Steve Bruning

- a. See attached Minutes of the Handbook Subcommittee Meeting with reviewer comments and tables that need updating for 2016
- b. Reviewed final draft of Chapter 18 (non-residential)
 - i. Bruning passed out updated Table 3A from RP-1681 results. (see attached)
 1. Radiative Fraction in Table 3A is clarified as a portion of space fraction in Chapter 17 text.
 2. Shrestha suggested N/A should be 1.0
 - ii. RP-1631 results will be updated in total
 - iii. Bruning passed out excerpt from Kaiser plug load article. Departmental and facility data seems very site specific, but room type load densities (Table 4 in handout) are very usable and Bruning suggests including in HOF Chapter 17. For example Office Data aligns with current data in Chapter. Wilkins expressed some concern on methods for determining peaks. Some text will need to be added to describe data limitations use.
 - iv. Need to touch base with TC 9.6 for new data from medical equipment load testing.
 - v. Bruning will add a paragraph on peak coil load differences from space load due to system impacts

- vi. Motion to Approve Chapt 18: Bruning
Second: Wilkins
Vote: 8-0-0 CNV

c. Chapter 17 Residential: Chip Barnaby is reviewing some comments

- i. Text changes are minor and editorial in nature
- ii. Some tables and equations change due to weather data.
- iii. Asking for extension to 8/1/16 for TC electronic ballot and submit to ASHRAE mid-August. Bruning clarified that extension is due to weather data impacts to examples. Chapter 18 is going in without updates. David Yuill asked if we could vote to approve here but submit by end of July. This seems ok due to no changes in methodology.
- iv. Motion to approve changes Chip is working on to Chapter 17 with review by Bruning:
Motion: Bruning
Second: Doeffferger
Vote: 8-0-0 CNV

10. TC 4.1 Web Site

- a. Website is updated to current ASHRAE model
- b. New format for mobile devices
- c. See bottom of agenda for website address
- d. Jim asked for suggestions for improvements

11. Old Business: None

12. New Business

- a. New Multidisciplinary Task Groups
 - i. IAST – Impact of ASHRAE Standards and Technology.
 - ii. OBB Occupant Behavior in Buildings. Glenn is on OBB and can represent TC 4.1

b. Roster Changes

- Two (2) members are rolling off on June 30. Som & Glenn
- Three (3) new members: Chip, Dave, Suzanne
- Provisional members will become corresponding members.
- New Chair – Bob Doeffinger
- VC – Larry Sun
- Secretary – Suzanne
- Research Chair – Legaretta
- Handbook Chair – Jim Pegues
- Keep Jim off for a year then roll back on.

13. Executive Session

a. RP-1729

- i. PES made recommendation on bidder. All bids were very close and all submissions were of high quality

b. Glenn will be PMS chair, Chris, Dave & Som on PMS. TC 5.3 member John Bade.

c. Take RP-1681 slot for PMS meetings

14. Motion to Adjourn: Spitler

- Second: Legaretta
- Vote: 8-0-0, CNV

Attachments:

- A. TC Section Chair Breakfast Handout
- B. Research Subcommittee Report
- C. Programs/Standards Subcommittee Report
- D. Handbook Subcommittee Report
- E. HOF Chapter 17 Table 3A
- F. Kaiser Plug Load Table
- G. St. Louis Agenda

ATTACHMENTS A-G

AGENDA
SECTION TC/TG/TRG CHAIR'S BREAKFAST MEETING
 2016 Annual Meeting
 St. Louis, MO

Sunday, January 26th

6:30 A.M. – 8:00 A.M. EDT

Marriott St. Louis Grand – ALL Section meetings located on either CP2 or CL level

Section 1, Majestic H Room – CP2

Section 3 Landmark 3 Room - CL

Section 5, Majestic G Room CP2

Section 7, Landmark 7 Room - CL

Section 9, Majestic F Room – CP2

Section 2, Landmark 2 Room - CL

Section 4, Landmark 1 Room - CL

Section 6, Landmark 6 Room - CL

Section 8, Majestic C Room – CP2

Section 10, Landmark 5 Room - CL

- I. CALL TO ORDER
- II. ROLL CALL AND INTRODUCTIONS (5 minutes)
- III. ADDITIONS AND/OR CHANGES TO THE AGENDA (5 minutes)
- IV. REVIEW MINUTES/NOTES, SPECIAL ASSIGNMENTS, ACTION ITEMS FROM LAST MEETING, AND NEW ISSUES (30 minutes).
 New Assignments:
 A. **To be determined**
- V. IDENTIFY SHARED OPPORTUNITIES AND CHALLENGES FOR SECTION (10 minutes).
 Society Strategic Plan? Research Strategic Plan?, Handbook workshop recommendations?, etc.
- VI. REVIEW SECTION MBOs (10 minutes).
 Discuss section and TC MBOs for this year and coming year and how the section can work together to address them or establish section and TC MBOs if not already done.
- VII. DISTRIBUTE WRITTEN INFORMATION AND REQUESTS FROM SOCIETY LIAISONS TO TC/TG/TRG CHAIRS (30 minutes).

Additional Potential Announcements/Reminders:

A. NEW!

1. Discuss and confirm that TGs, TRGs, and MTGs in section will continue in 16-17 Society Year
2. 16-17 Rosters Access & Distribution
3. MTGs that have been formed since Orlando Meeting – MTG.IAST & MTG.OBB
4. Other potential new MTGs being considered by TAC – MTG.ACR (Air Change Rate)
5. Updated TC Website template – Initial Feedback or Suggested Improvements, if any?
6. Oversight of TC websites with regard to Technical Bulletins and alignment with Society
7. Additional TC E-mail Position Aliases Now Available
8. New Restructured TC MOP (Manual of Procedures) to be issued after St. Louis Meeting
9. Distribution of TC minutes changed in TC MOP
10. How to Import Your TC Roster Information into MS-Outlook
11. Updated TAC Presentation Template Available for TC members to use with local Chapter
12. Basecamp Information from ECC
13. Conference & Exposition Committee (CEC) On-going Issues with Program Presentation Submissions

B. AT THIS MEETING

1. On-Site Training Options
2. RAC Seminar 47 – Update on the ASHRAE Innovative Research Grant Program and Future Plans for It - Monday 11 am
3. Location of Section Head Mailboxes & Free Wi-Fi Access at this Society Meeting
4. RPM (Remote Participation Meetings) – Formerly known as E&P meetings
5. Retiring TC/TG/TRG/MTG Chair Certificates

C. UPCOMING DEADLINES

1. TC Activity Forms for the St. Louis Meeting are Due to Section Heads before Wednesday, 6/29/16
2. Thank You Letters to Employers – Look for deadline in ASHRAE e-mail that will be sent.
3. Seminar and Forum proposals for Las Vegas are due by Monday, August 8, 2016
4. 2016-2017 Hightower Award & Service to ASHRAE Research Award Nominations by Thursday, September 1st

D. REMINDERS

1. Useful TC/TG/TRG/MTG Chair Information and forms on ASHRAE Website
2. Request for each TC to review ASHRAE Code of Ethics at start of TC meeting
3. Make Special Effort to Welcome New Members and Visitors (Potential Members) to TC Meeting
4. Option for TC Subcommittee Meetings via Conference Calls and Web Meetings
5. Is you TC Website Up-to-date?

E. RECENT ANNOUNCEMENTS

1. RAC Prioritizing Research Topics Related to Residential Sector
2. CEC's Standing Request for Future Society Meeting Program Track Suggestions
3. CEC Seeks TC Volunteers willing to Support Content Development and Quality Control for Society Technical Program at Society Meetings
4. The Professional Development Committee (PDC) is seeking ideas for new ASHRAE Learning Institute (ALI) courses

F. CURRENT & UPCOMING ASHRAE CONFERENCE PROGRAMS

1. Program Focus of St. Louis Meeting
2. Las Vegas Meeting – January 28 – February 1, 2017
3. Long Beach Meeting – June 24 – 28, 2017

G. OTHER UPCOMING WORKSHOPS AND CONFERENCES

1. Indoor Air 2016
2. 2016 Purdue Conferences
3. ASHRAE and IBPSA-USA SimBuild 2016: Building Performance Modeling Conference
4. 2016 JSRAE Annual Conference
5. IAQ 2016 - Defining Indoor Air Quality: Policy, Standards and Best Practices
6. IEA EBC Annex 61 Deep energy Retrofit Forum
7. AHR Expo Mexico
8. 2nd International Conference Efficient Building Design: Materials and HVAC Equipment Technologies
9. IAQVEC 2016
10. Buildings XIII – Thermal Performance of the Exterior Envelope of Whole Buildings Conference
11. Sustainable Management of Refrigeration Technologies in Mobile Marine and Fisheries Sectors
12. 2017 AHR Expo
13. Second International Conference on Energy and Indoor Environment for Hot Climates
14. Beyond NZEB: Retrofit of existing Buildings
15. 12th IEA International Heat Pump Conference
16. ISHPC2017

VIII. REMARKS FROM SOCIETY LIAISONS TO TC/TG/TRG CHAIRS

Liaison members from Research Administration, ASHRAE Program, Handbook, Standards, and other standing committees will have an opportunity to describe their committee activities that relate to the TC/TG/TRG functions, if time permits. Written announcements must be provided as a minimum by liaisons in order to have an opportunity to speak at this meeting.

ADJOURN

Announcements and Reminders for TC/TG/TRG & MTG Chairs St. Louis 2016

A. **NEW!**

1. **Discuss and confirm that TGs, TRGs, and MTGs in section will continue in 16-17 Society Year -TBD**
2. **16-17 Rosters Access & Distribution** - Remember, the current 2015-2016 roster for your TC, TG or MTG is in effect until after the June meeting this year – through Thursday, June 30th.

By now, each TC, TG and MTG chair should have received a PDF & MS-Excel file of their new 2016-2017 roster from their Section Head or staff for distribution to the committee. In addition, each member can view all of the rosters of their committees on the ASHRAE Website. Go to www.ashrae.org <http://www.ashrae.org>, click on the "Membership & Conferences" tab in the header, click on "My Membership" text in the left sidebar, and log in (if you have not logged in lately, you might need to set up a new username and password). Click on the "Update Your Bio / View or Edit Your Profile" link. Now, you should see your current "bio info". Click on "Committees" on the left sidebar; all of the committees you are a member of will appear. Click on the "blue" roster text at the left hand side of a committee to reveal the roster with linked contact information. Make sure everyone on your committee also knows how to access the roster.

The Provisional Corresponding Member (PCM) position is a relatively new position on TC/TG/TRG rosters. This position allows potential new members to be added by staff to the committee roster any time a request for membership is made by an individual. The position has a 2-year term on the committee. Staff will notify the chair and reissue a new roster to the committee chair any time a provisional member is added. The TC/TG/TRG chair has the option each year during the regular roster update process to convert provisional CMs that have been active participants on the committee the past year into regular CMs or voting members or drop them. If no action is taken, they will time expire from the roster and be removed by staff.

It is suggested that TC chairs start to clean-up their rosters and keep them current by asking corresponding members to confirm their participation for next year's roster update

3. **Two New Multidisciplinary Task Groups (MTGs) have been formed since Orlando meeting**

MTG.IAST – Impact of ASHRAE Standards and Technology on Energy Savings/Performance

Scope: MTG.IAST will generate research proposal(s) and work with the selected consultants/contractors to conduct research, collect and organize the data in a useful and conveniently summarized format for Initiative 1B of the Society Strategic Plan "ASHRAE will research the true impact of its standards and technology" as requested by the BOD.

The chair of this MTG is Dan Pettway.

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MTG.OBB – Occupant Behavior in Buildings

Scope: MTG.OBB will coordinate TC/TG/TRG technical activities to help implement the recommendations from this MTG. This includes coordinating efforts in education, modeling, research, standards, marketing, advocacy, and fund raising within ASHRAE. Research project initiation as the sponsoring committee is included in the scope of this MTG.

Occupant behavior in buildings refers to occupants' comfort preference, presence and movement, and interactions with building systems that have impact on performance (thermal, visual, acoustic, and IAQ) of buildings. The interactions include adjusting the thermostat settings, opening or closing windows, dimming or turning on/off lights, pulling up or down window blinds, switching on or off plug-loads, and consuming domestic hot water.

The chair of this MTG is Tianzhen Hong.

For more information on these two new MTGs and the eight other existing MTGs, please go to the MTG section on the following web page: <http://www.ashrae.org/tcs>.

If your TC would like to have a voting representative on a particular MTG, please contact the ASHRAE Manager of Research and Technical Services, Mike Vaughn, at MORTS@ashrae.net.

4. Other potential new MTGs being considered by TAC – MTG.ACR (Air Change Rate)

TAC is also considering at this meeting a proposal to form a new MTG.ACR (Air Change Rate). It is proposed that the new MTG will help evaluate the technical basis and adoption of airflow rate specifications in terms of Air Change Rate (ACR) or Air Changes per Hour (ACH) for spaces such as cleanrooms, laboratories, patient rooms, operating rooms, and other similar spaces. The proposal includes voting representatives and alternates from the following TCs: 2.2, 4.3, 5.3, 5.8, 9.2, 9.6, 9.10, and 9.11 plus other groups such as SSPC 62.1 and SSPC 170

5. New TC Website template – Initial Feedback or Suggested Improvements, if any?

Since the Orlando meeting, the Society's Electronic Communication Committee (ECC), ECC staff, TAC volunteers Gage and Cooper, and a consultant have been working to modernize and streamline the template for TC websites and now most (93 out of 95) of the TC websites have been moved to this new template. The new template so far includes WIZYWIG editing, automatic rosters, and simplified document uploading. There is no longer a need for HTML editing. If you have any feedback on the new template or suggestions for additional features, please let your Section Head and MORTS know.

6. Oversight of TC websites with regard to *Technical Bulletins* (White Papers) and alignment with Society positions, policy, or opinions

TCs are allowed to develop Technical Bulletins - A Technical Bulletin does not result from a technical meeting and is a brief 1-2 page statement on a special interest HVAC&R topic that has been developed by either a technical or grassroots committee of ASHRAE. After the TC approves the Technical Bulletin, TAC is responsible for coordinating a peer review by a minimum of three persons with expertise in the field of

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the bulletin before it can be posted. In addition, ASHRAE's policy for websites states the following: **"4 (3) f. Statements and presentations may not appear on web sites that state, purport, or imply that they present ASHRAE positions, policy, or opinions."**

7. Additional TC E-mail Position Aliases Now Available

New position e-mail alias addresses have now been created for each of the remaining mandatory positions of the Technical Committee management team (Secretary, Standards Sub. Chair, Program Sub. Chair, Handbook Sub. Chair, and Webmaster). The 15-16 E-mail Alias list is posted on the ASHRAE website www.ashrae.org/TCs under the heading *Procedures, Forms & Information for TCs/TGs/MTGs and TRGs*. The new 16-17 E-mail Alias list will be posted in the same location shortly after the St. Louis meeting.

8. New Restructured TC MOP (Manual of Procedures) to be issued after St. Louis Meeting

TAC has restructured the TC MOP so that it is easier to navigate and find information. The new TC MOP can be found on the ASHRAE website www.ashrae.org/TCs under the heading *Procedures, Forms & Information for TCs/TGs/MTGs and TRGs*.

9. Distribution of TC minutes changed in TC MOP

The TC MOP and *TC/TG/MTG/TRG Minutes Cover Sheet* form have both been updated and you are no longer required to send the TAC chair a copy of your minutes after each meeting. The new minutes cover sheet can be found on the ASHRAE website www.ashrae.org/TCs under the headings *Procedures, Forms & Information for TCs/TGs/MTGs and TRGs – Routine Forms for TC/TG/MTGs/TRGs*.

10. How to Import Your TC Roster Information into MS-Outlook

Detailed instructions on how to import your TC roster information into MS-Outlook has been created and an e-mail announcement will be issued to all TC chairs, vice chairs, and secretaries once these instructions and the restructured TC MOP are posted to the TC page of the website (www.ashrae.org/TCs)

11. Updated TAC Presentation Template Available for TC members to use with local Chapter

TAC recently updated the standard presentation and presentation notes that TC members can use, without a lot of effort, to explain what TCs do to their local ASHRAE Chapter. You should also know that use of this presentation at a chapter meeting in SY 16-17 will earn a chapter 50 (100 points maximum) PAOE points. Additional PAOE points are also possible in SY 16-17 for a presentation(s) on the work of one specific TC.

The new presentation and presentation notes files are posted now at the following link www.ashrae.org/tcs under the heading *General TC Information* at the top of the page in case you prefer to direct others to these files posted online.

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12. Basecamp Information from ECC

Thanks to the efforts of the Society's Electronic Communication Committee (ECC) many TCs are now taking advantage of an online collaborative tool called *Basecamp* in order to carry-out their committee work in a more efficient fashion. If your TC is interested in possibly establishing your own Basecamp, please go to the following link to learn more about Basecamp: <https://www.ashrae.org/basecampguidance>. To establish a Basecamp, please contact Joslyn Ratcliff, at eccstaff@ashrae.net

13. CEC Ongoing Issues with Program Presentation Submissions

Presentations for St. Louis were due in early June. At the close of Confex (6/21), 11 sessions had not been uploaded.

Starting in Las Vegas, presenters with presentations not uploaded by the published due date, will incur a "strike" in our 3-strike policy. Once three strikes have accrued, the speaker will not be allowed to speak for a period of time that could be up to one calendar year or more.

B. AT THIS MEETING

1. On-Site Training Options

Ask your subcommittee chairs (program, research, handbook, etc.) to attend relevant training

i. **TC/TG/TRG Chair's Training Workshop Reminder**

Sunday June 26th, 9:45-10:45 AM in Room #221, 2nd Level, in the America's Convention Center. The training will start with a brief presentation on how to run Effective Meetings and then highlight some of the online resources that are available through the TAC training portal for additional training and information on a variety of topics. The training session will also have a Q&A session so that you can also get answers to your specific questions.

ii. **RAC's Research Subcommittee Chair's Breakfast**

Monday, June 27th, 6:30 AM – 8:00 AM in Majestic D/E room, Conf. Plaza 2nd Level (CP2), Marriott St. Louis Grand Hotel. Please encourage your Research Subcommittee Chair or another representative from the TC to attend this meeting so that your RAC Research Liaison (RL) can get an update on the TC's research activities and so that your RL can help resolve issues & questions that TC may have concerning their research program. The training portion of this meeting will focus on changes to the *Research Manual*.

iii. **TC Program Subcommittee Chair Training in St. Louis**

Tuesday, 6/28, 11:15 AM – Noon, Room #220, 2nd Level, in the America's Convention Center. *Don't complain about the meeting program and your TC's submissions if you have not been to training.*

A few things you might learn in training are as follows:

- Incomplete program submissions is the biggest reason for rejection now. All information is needed up front for CEC selection process.

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- A packaged session on a similar topic is the best way to greatly improve your chances for acceptance.
- There is no difference in how CEC handles 60 and 90 minute program slots. 60 minute slots are just as good as 90 minute slots if complete.

iv. **TC Handbook Subcommittee Chair Training in St. Louis**

Sunday, 6/26, 8 AM – 9 AM, Aubert Room, Mezzanine Level, Marriott St. Louis Grand

This special session will introduce the new **ASHRAE Authoring Portal** for collaborative work on Handbook chapters or other publications. The session will also show new TC Handbook chairs (and TC chairs) what they need to know about Handbook chapter development and revision—the process, the product, and how to succeed. Includes time for Q&A and discussion.

2. **RAC Seminar 47 – Update on the ASHRAE Innovative Research Grant (IRG) Program and Future Plans for It**

RAC is sponsoring a seminar on Monday, 6/27, from 11 AM to 12 PM in Room #227, 2nd Level, in the America's Convention Center. Two presentations will cover the results from the first two IRGs, which are now complete, and the third presentation will cover what RAC plans to do with the program going forward.

3. **Location of Section Head Mailboxes & Free Wi-Fi Access at this Society meeting**

Mailboxes are located just outside ASHRAE Headquarters Office (Kingsbury / Westmoreland rooms – Conf. Bldg. Street Level – Marriott St. Louis Grand Hotel).

Also, Internet access and computers for e-mail are available in the Cyber Café located in the registration area during operating hours. Please be considerate to others and limit your usage to five minutes.

Wireless internet will be available in all meeting rooms at the Marriott and Convention Center. ASHRAE will be working with the internet provider to manage the bandwidth so that member expectations of accessibility and speed are fulfilled. We would like to request that everyone limit their usage to functions that do not use excessive bandwidth. Applications such as Facebook, YouTube, streaming video, etc. use excessive bandwidth.

Marriott Wi-Fi Access: **Marriott Conference** is the network, **ashrae16** is password (case sensitive).

Convention Center Wi-Fi Access: **ASHRAE** is the network, **ashrae16** is password (case sensitive).

4. **RPM (Remote Participation Meetings) being held in St. Louis**

The 10th RPM beta test (Remote Participation Meetings – Formerly known as E&P meetings), which allows some TC members to participate in the TC meeting from a remote location electronically, will occur in St. Louis and the following fifteen TCs have agreed to participate in this test: TC 1.5, TC 1.10, TC 1.12, TC 2.2, TC 4.2, TC 5.8, TC 6.8, TC 6.9, TC 7.3, TC 7.9, TC 8.4, TC 8.8, TC 9.2, TC 10.2, TC 10.3 – This represents a 25% increase over the number of TC's hosting RPM meetings in Orlando. A total of 38

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RPM meetings will be hosted in St. Louis when you include project committee meeting. For comparison, a total of 31 RPM meetings were hosted in Orlando.

The chairs of those TCs participating should provide to their Section Head feedback on their RPM meeting experience before TAC meets on Wednesday morning, 6/29.

5. Retiring TC/TG/TRG/MTG Chair Certificates

TC chairs that are completing their terms as chair at this Society meeting will be presented with a certificate of appreciation. Please coordinate with your Section Head as to when and where at the meeting you would like to be presented with the certificate (Section meeting or TC meeting).

C. UPCOMING DEADLINES

1. TC Activity Forms for the St. Louis Meeting are due to Your Section Head before Wednesday, 6/28/16

TC/TG/TRG Activity Feedback Form (Excel) can be downloaded from the Technical Committee webpage under the "TC Forms and Documents" page -

<https://www.ashrae.org/standards-research-technology/technical-committees/tc-forms-and-documents>. Section heads can also provide an electronic copy of the form if requested.

2. Thank You Letters to Employers

ASHRAE President – David Underwood – has offered to send letters to the employers of TC volunteers this year thanking them for supporting their employee's service on an ASHRAE TC during Society year 2015-2016. If requested by the volunteer, the letter will be sent to his/her employer by the end of July or early August and the volunteer will receive a copy.

Please let your committee members know that they will be receiving an email about employer thank you letters in early July with details on how to request a thank you letter.

3. Seminar and Forum proposals for Las Vegas are due by Monday, August 8th, 2016.

Please visit the following site to submit your proposal:

<http://ashraem.confex.com/ashraem/w17/cfp.cgi>

For more information, go to: www.ashrae.org/lasvegas

4. 2016-2017 Hightower Award & Service to ASHRAE Research Award Nominations by Thursday, September 1st

Nominations for the 2016-2017 *George B. Hightower Technical Achievement Award* are due to you Section Head by September 1, 2016. The award recognizes outstanding technical leadership and contributions on a TC/TG/TRG during the past four years, excluding research and standards activities. Please go to the Technical Committee page of the ASHRAE website at the following link under the "Procedures, Forms..." heading:

<http://www.ashrae.org/tcs>

Nominations for the 2016-2017 *Service to ASHRAE Research Award* for TC volunteer efforts in research are due to RAC research liaison by September 1, 2016. Please go to

Announcements and Reminders for TC/TG/TRG & MTG Chairs ST. LOUIS 2016

the Research page of the ASHRAE website at the following link under the “Research Grants and Awards” heading: <http://www.ashrae.org/research>

D. **REMINDERS**

1. **Useful TC/TG/TRG/MTG Chair Information and forms on ASHRAE website**

Information for TC/TG/TRG and MTG chairs can be found on the Technical Committee page of the ASHRAE website at the following link: <http://www.ashrae.org/tcs>

An updated draft of the TC/TG/TRG Manual of Procedures (MOP) is being considered for approval by TAC at the St. Louis meeting and it is expected to be posted soon to this site and announced to all TC chairs once posted.

2. **Request for each TC to briefly review ASHRAE Code of Ethics at start of meeting**

See the following link for the latest version of the ASHRAE Code of Ethics:
<https://www.ashrae.org/about-ashrae/>

3. **Make a Special Effort to welcome new Members, and Visitors to TC meeting**

Potential new members for your committee have been encouraged to drop-by your meeting. As a result, please make a special effort to recognize and warmly welcome all visitors to your meeting – A TC can never have too many willing and able volunteers.

4. **Option for TC Subcommittee Meetings via Conference Calls and Web Meetings**

More and more TCs are taking advantage of a new Society service that allows TCs to hold subcommittee meetings by phone and/or web. Many TCs are finding this to be a more efficient way for them to conduct subcommittee business and it also allows TC members that can't travel to meetings on a regular basis a way to still contribute to the TC. Such a change can also eliminate potential conflicts with the TC's program sessions at Society meetings. Please pass your conference call/web meeting/webinar requests on to the Manager of Research and Technical Services, Mike Vaughn, at mvaughn@ashrae.org or MORTS@ashrae.net

5. **Is Your Committee Website up to Date?**

If not, please ask your webmaster to at least post the latest minutes and the St. Louis meeting times and agenda. If your website has been neglected, add an action item for this meeting to appoint a responsible member of the TC/TG/TRG who will bring it back to life. The new TC website template has greatly simplified the duties of the TC webmaster and this form of communication is critical to the efficient operation of your committee, and for attracting new members.

The recent conversion to a new TC website platform highlighted a couple areas where a refresher of the ASHRAE rules on website maintenance is warranted. First be aware that ASHRAE Products (i.e., handbook chapters, journal articles, final reports from research projects, etc.) cannot be published on your TC's website. It is very appropriate to post the title and scope of the product and then link the reader to the ASHRAE bookstore or other location on the ASHRAE site where the product may be purchased. Any possible exceptions to this rule must be sent through Steve Comstock for review and approval (scomstock@ashrae.org). The second issue involves timely posting of the draft minutes. Draft minutes (and final, approved minutes from the prior meeting) should be posted to your website (or otherwise distributed to the members) within 60 days after

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the meeting. Please ensure that your secretary and webmaster are aware of this deadline. To assist your secretary in understanding the procedures for taking and reporting minutes, a video has been developed and posted on the Technical Committees' Training page (<https://www.ashrae.org/standards-research--technology/technical-committees/tc-training-and-presentations>). On the same page, a video has also been posted for use by webmasters to learn about the procedures and schedule to maintain the new websites.

E. RECENT ANNOUNCEMENT

1. **RAC Prioritizing Research Topics Related to the Residential Sector**

Continuing in 2016-2017, RAC will be prioritizing for bid accepted research topics that support Goal #3 below from the Research Strategic Plan.

Goal #3: To reduce significantly the energy consumption for HVAC&R, water heating and lighting in existing homes.

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

The Conferences and Expositions Committee (CEC) oversees ASHRAE's annual and winter conferences and other specialty conferences and expositions globally. The CEC continually works to improve the conference experience for all attendees. To help keep a "pulse" on the technical issues facing professionals in the HVAC&R marketplace, and to create meetings that reach all of ASHRAE's constituencies, the CEC seeks ideas for tracks for the Chicago 2018 meeting and annual and winter conferences beyond as well as topics for specialty conferences from TC members.

Please submit your suggestions to ASHRAE Staff member Tony Giometti (Giometti@ashrae.org). You can also add your track suggestion in the "Comment" section of the TC Activity form for the St. Louis meeting.

3. **CEC Always Seeks TC Volunteers willing to Support Content Development and Quality Control for Society Technical Program at Society Meetings**

Provide to your Section Head after each Society meeting a list of qualified volunteers from your TC that are potential Technical Session chairs and reviewers of session papers that are related to TC's scope for use by the Conferences & Expositions Committee (CEC) in developing technical content for future technical programs.

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

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

Contact Karen Murray (ASHRAE staff) kmurray@ashre.org or Jim Bochat (2016-17 PDC chair) jim.bochat@cxconcepts.com with your course ideas.

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F. **CURRENT & UPCOMING ASHRAE CONFERENCE PROGRAMS**

1. **St. Louis Annual Conference - June 25 – June 29, 2016**

Conference Program Chair: Tom Kuehn Email: kuehn001@umn.edu

Program Focus at St. Louis Annual Conference

- i. Track 1: Advances in Refrigeration Systems and Alternative Refrigerants
- ii. Track 2: Research Summit
- iii. Track 3: Fundamentals and Application
- iv. Track 4: HVAC Systems and Equipment
- v. Track 5: Smart Building Systems/Remote Monitoring and Diagnostics
- vi. Track 6: Indoor Environment: Health, Comfort, Productivity
- vii. Track 7: Professional Skills Beyond Engineering
- viii. Track 8: Renewable Energy Systems and Net Zero Buildings

2. **Las Vegas Annual Conference – January 28 – February 1, 2017**

Seminar and Forum proposals for Las Vegas are due by **Monday, August 8th, 2016.**

Conference Website: <http://ashraem.confex.com/ashraem/w17/cfp.cgi>

Conference Program Chair: Leon Shapiro Email: leoneshapiro@gmail.com

Program Focus at St. Louis Annual Conference

- i. Track 1: Fundamentals and Applications
- ii. Track 2: HVAC&R Systems and Equipment
- iii. Track 3: Water-Energy Nexus
- iv. Track 4: Commercial and Industrial IAQ
- v. Track 5: Mission Critical Design and Operation
- vi. Track 6: Effects of Climate Change on HVAC&R
- vii. Track 7: Energy Efficient Industrial Buildings
- viii. Track 8: Building Operation and Performance

3. **Long Beach Annual Conference - June 24 – June 28, 2017**

Seminar and Forum proposals for Long Beach are due by **Monday, February 6th, 2017.**

Conference Website: <http://ashraem.confex.com/ashraem/s17/cfp.cgi>

Conference Program Chair: Ann Peratt Email: ann.peratt@gmail.com

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Program Focus at Long Beach Annual Conference

- i. Track 1: Fundamentals and Applications
- ii. Track 2: HVAC&R Systems and Equipment
- iii. Track 3: Refrigeration
- iv. Track 4: Building Life Safety Systems
- v. Track 5: Controls: Smart Building Systems and the Security Concerns as Technology Emerges
- vi. Track 6: Commissioning: Optimizing New and Existing Buildings and their Operation
- vii. Track 7: Net Zero Energy Buildings: The International Race to 2030
- viii. Track 8: Residential Buildings: Standards and Guidelines and Codes
- ix. Track 9: Research Summit

G. OTHER UPCOMING WORKSHOPS, CONFERENCES AND EVENTS

1. 2016

- i. **Indoor Air 2016** (14th International Conference of Indoor Air Quality and Climate) – July 3 to 8, 2016 – Ghent, BELGIUM – Contact: <http://www.indoorair2016.org/>
- ii. **2016 Purdue Conferences** – July 11 to 14, 2016 – Purdue University West Lafayette, IN, USA – Contact: <http://engineering.purdue.edu/HerrickConf>
- iii. **ASHRAE and IBPSA-USA SimBuild 2016: Building Performance Modeling Conference** – August 10-12, 2016 – Salt Lake City, Utah USA – Contact: <http://ashraem.confex.com/ashraem/ibpsa16/cfp.cgi>
- iv. **2016 JSRAE Annual Conference** – Sep. 6 – 9, 2016 - Kobe University (Rokkodai Campus, Kobe, JAPAN) – Contact: <https://nenji.jsrae.or.jp/nenji2016/en/index.html>
- v. **IAQ 2016 - Defining Indoor Air Quality: Policy, Standards and Best Practices** – September 12-14, 2016 – Alexandria, Virginia USA – Contact: <http://ashraem.confex.com/ashraem/iaq16/cfp.cgi>
- vi. **IEA EBC Annex 61 Deep Energy Retrofit Forum** - Sep 15 -16, 2016 - Washington, DC USA – Contact: <http://iea-annex61.org/>
- vii. **AHR Expo Mexico** - Sep 20 -22, 2016 - Monterrey, MEXICO – Contact: <http://www.ahexpomexico.com/>

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- viii. **2nd International Conference Efficient Building Design: *Materials and HVAC Equipment Technologies*** - September 22 to 23, 2016 - Beirut, LEBANON – Contact: <https://www.ashrae.org/membership--conferences/conferences/2016-2nd-international-conference-efficient-building-design>
- ix. **IAQVEC 2016** (9th International Conference on Indoor Air Quality Ventilation & Energy Conservation in Buildings) – Oct. 23 -26, 2016 – Seoul, SOUTH KOREA - Contact: <http://iaqvec2016.org/> or info@iaqvec2016.org
- x. **Buildings XIII** – Thermal Performance of the Exterior Envelope of Whole Buildings Conference – Dec. 4 - 8, 2016 - Clearwater Beach, FL USA – Contact: <http://web.ornl.gov/sci/buildings/2016/index.shtm>

2. 2017

- i. **Sustainable Management of Refrigeration Technologies in Mobile Marine and Fisheries Sectors** - January 11-13, 2017 - Bangkok, THAILAND – Contact: <https://www.ashrae.org/membership--conferences/conferences/ashrae-conferences/marine-2017>
- ii. **2017 ASHRAE Winter Conference & AHR Expo** – Jan. 28 to Feb.1, 2017 – Las Vegas, NV – Contact: <http://ashraem.confex.com/ashraem/w17/cfp.cgi>
- iii. **2nd International Conference on Energy and Indoor Environment for Hot Climates** - February 26 - 27, 2017 - Doha, QATAR – Contact: <https://www.ashrae.org/membership--conferences/conferences/ashrae-conferences/energy-and-indoor-environment-for-hot-climates>
- iv. **Beyond NZEB: Retrofit of Existing Buildings** – May 10 - 11, 2017 – Matera, ITALY – Contact: <http://www.aicarr.org/Pages/EN/Upcoming%20Events/2016/50AiCARR.aspx>
- v. **12th IEA International Heat Pump Conference** – May 15 to May 18, 2017 – Rotterdam, NETHERLANDS – Contact: <http://hpc2017.org/>
- vi. **ISHPC2017** – Aug. 7 – Aug. 10, 2017 – Tokyo, JAPAN – Contact: <http://biz.knt.co.jp/tour/2017/ISHPC2017/congress.html>

Conferences and Expositions Committee Information Items for Technical Committees Annual Meeting, St. Louis 2016

1. **2017 ASHRAE Winter Conference in Las Vegas, NV:** <http://www.ashrae.org/LasVegas>
 - a. Conference Papers are due on July 8, 2016
 - b. Seminar, Forum, and Workshop proposals are due August 8, 2016
 - c. Confex opens for presentation uploads December 2, 2016
 - d. All presentations due online January 2, 2017.
 - **Track 1: Systems and Equipment**
Track Chair: Chuck Curlin Email: ccurlin@shultzeg.com
 - **Track 2: Fundamentals and Applications**
Track Chair: Michael Collarin Email: Michael.Collarin@parsons.com
 - **Track 3: Water-Energy Nexus**
Track Chair: Gary C. Debes Email: gcdebes@verizon.net
 - **Track 4: Commercial and Industrial IAQ**
Track Chair: Kevin Marple Email: kmarple@benzco.com
 - **Track 5: Mission Critical Design and Operation**
Track Chair: Carrie Anne Crawford Email: carriecrawford@eeace.com
 - **Track 6: Effects of Climate Change on HVAC&R**
Track Chair: Rocky Alazazi Email: mralazazi@yahoo.com
 - **Track 7: Energy Efficient Industrial Buildings**
Track Chair: Corey Metzger Email: corey.metzger@resourcece.com
 - **Track 8: Building Operation and Performance**
Track Chair: Cynthia Moreno Email: cindym@tmmechanical.com

2. **2017 ASHRAE Annual Conference in Long Beach, CA:** www.ashrae.org/LongBeach
 - a. Conference Papers Abstracts due August 29, 2016
 - b. Conference Papers due December 9, 2016
 - c. Seminar, Forum and Workshop proposals are due February 6, 2017
 - d. Confex opens for presentation uploads May 1, 2017.
 - e. All presentations due online June 2, 2017.
 - **Track 1: Fundamentals and Applications:**
Track Chair: Frank Schambach Email: frankschambach@mindspring.com
 - **Track 2: HVAC&R Systems and Equipment:**
Track Chair: Jennifer E. Leach Email: pennst8jen@yahoo.com
 - **Track 3: Refrigeration:**
Track Chair: Vikrant Aute Email: vikrant@umd.edu
 - **Track 4: Building Life Safety Systems:**
Track Chair: Robert Alan Neely Email: alan_neely@pghcorning.com
 - **Track 5: Controls – Smart Building Systems and the Security Concerns as Technology Emerges:**
Track Chair: Melanie Derby Email: derbym@ksu.edu

- **Track 6: Commissioning – Optimizing New and Existing Buildings and their Operation:**

Track Chair: Dennis Alejandro

Email: denzjac@yahoo.com

- **Track 7: Zero Net Energy Buildings – The International Race to 2030:**

Track Chair: Jason DeGraw

Email: jason.degraw@nrel.gov

- **Track 8: Residential Buildings – Standards Guidelines and Codes:**

Track Chair: Kimberly Pierson

Email: kdpwildcat@gmail.com

- **Track 9: Research Summit**

Track Chair: Ann Peratt

Email: ann.peratt@gmail.com

3. Program statistics for St. Louis; for a total of 107 available slots:

Conferences Papers

- 130 conference paper abstracts submitted, 124 approved
- 84 conference papers received
- 71 conference papers presented
- 22 Conference Paper Sessions

Technical Papers

- 60 conference papers received
- 28 conference papers presented
- 9 Technical Paper Sessions

Seminars

- 116 submitted
- 64 presented

Workshops

- 10 submitted
- 8 presented

Forums

- 12 submitted
- 4 presented

4. Invited Speakers:

CEC has developed a policy to allow for invited speakers to have their speaker fee waved. The proposed invited speakers shall be submitted with the respective program submission, and will be reviewed concurrent to the submission review process. The CEC Chair, Vice Chair, and Conference Program Chair will review submissions and will accept up to five invited speakers, per Annual and Winter meeting, considering the strength of the proposal. The speaker must meet the following criteria to be considered: a.) Subject matter expert, b.) Not an ASHRAE member, c.) Will provide information that is useful to the ASHRAE membership.

5. Potential Sources Bias Disclosure:

Starting at the 2016 Annual Meeting in St. Louis, speakers will be asked to fill out a potential sources bias disclosure document that will note an affiliations/involvement with any organizations with financial or commercial interest in the subject matter to be discussed, in accordance with the ASHRAE code of ethics.

6. TC Opportunities:

- TC members who want to submit a program should consult the Track Chair for assistance in preparing a good abstract, learning objectives, and Q&A to help assure complete submission.
- TC's and Sections are welcome to suggest new presentation formats (like how the Workshop was born). Best way to present material to benefit attendee is a goal.

- c. TC's and Sections are encouraged to work with a track chair to put together a series of sessions that can be used as a mini-track.
- d. Putting together an entire track of programs in cooperation with other TC's is also encouraged; keeping in mind that track subjects are typically determined 14-15 months prior to a conference.
- e. CEC welcomes suggestions for tracks! We value your input. TAC/CEC agreed that the Comment Section on the activity form is the location for the TC to provide this information.

7. Speaker Ratings:

About 12 speakers from Orlando had speaker ratings below 3.5 out of 5.0. These speakers were sent letters indicating that if they receive two additional low ratings they will be required to provide proof that they have received speaker training before they will be permitted to speak again.

8. Presentations:

CEC has had an ongoing issue with presentations not being uploaded for commercialism review before the conference. This is problematic because it requires a "fire drill" for CEC on Saturday and Sunday to process commercial reviews for these presentations before they can be uploaded to the system. For clarification, presentation requirements include:

- a. Presentations must be uploaded for commercialism before the deadline (**January 2, 2017 for Las Vegas**).
- b. Uploads need to be substantially complete; including the AIA Disclaimer and Learning Objectives. Blank slides and place holders do not constitute a substantially complete presentation.
- c. St. Louis Presentation Uploads
 - i. Approximately 30 sessions were not uploaded by the final due date.
 - ii. 11 Presenters were not uploaded as of June 24th for St. Louis. 9 of these programs were sponsored by TCs

CEC needs to hold speakers accountable for making deadlines. Starting with the 2017 Winter Meeting in Las Vegas, CEC will be enforcing a 3 strike policy for speakers who do not upload their presentation by the published deadline. If a speaker receives 3 strikes they will not be able to present for the following .

9. CEC Announces a Call for Reviewers:

ASHRAE has a number of conferences coming up that include papers, and CEC seeks your help in reviewing them. Specifically, there is an immediate need for reviewers for the following conferences: 2017 Winter Conference and various specialty conferences

Please contact Tiffany Cox, ASHRAE Assistant Manager, Conference Programs, at tcox@ashrae.org for more information or to volunteer to be a reviewer.

10. Program Types:

Technical Paper Session:

These sessions present papers on current applications or procedures, as well as papers resulting from research on fundamental concepts and basic theory. Papers presented in these session have successfully completed a rigorous peer review. Forms for written comment are available at each session, and sent to respective authors for reply and publication in ASHRAE transactions, if received by a certain date.

Conference Paper Session:

These sessions present papers on current applications or procedures, as well as papers reporting on research in process. These papers differ from technical papers in that they are shorter in length and undergo a much less stringent peer review.

Seminar:

These sessions features presentations on subjects of current interest. There are not papers attached to seminars.

Workshop:

These sessions enable technical committees and other ASHRAE committees to provide a series of short presentations on a topic requiring specific expertise. These short presentations are provided with an increased emphasis on audience participation and training in a specific set of skills. There are not papers attached to workshops.

Forum:

The sessions are “off-the-record” discussions held to promote a free exchange of ideas. Reporting of forums is limited to allow individuals to speak confidentially without concern of criticism. There are not papers attached to forums.

Program types starting at 2017 Annual Meeting in Long Beach**Panel Discussion:**

Panel discussions can feature a broad range of subjects and explore different perspectives on industry related topics. This session format includes a panel of 3-4 speakers each addressing a facet of the session topic, followed by an interactive discussion lead by the session chair. Panel Discussions may be 60 minutes or 90 minutes in length and will be posted online in the Virtual Conference.

Debate

Debates highlight hot-button issues commonly faced by our membership. Industry experts, either on teams or as individuals, argue opposing sides of an issue, concluding with position summaries and audience feedback. Debate sessions may be 60 minutes or 90 minutes in length and will be posted online in the Virtual Conference.

Technical Activities Committee (TAC) Liaison Report
K. Cooper
June 2016

Liaison Guidelines, January 10, 2016

Liaisons,

Whether you are attending a TAC Section Breakfast or a Technical Committee meeting, your primary task is to be sure that the committee understands what the most important information your committee wants this committee to know and to do it in the most effective way possible. The following guidelines will insure that you are successful and that you continue to have a cordial relationship.

1. **INFORM** the Section Head or Committee Chair in advance (if possible) that you will be attending and if you have specific time limitations for attending (such as you need to leave by XX:XX).
2. Before the meeting starts, **BE SURE YOU TELL** the Section Head or Committee Chair who you are, that you are available, wish to speak (if you do) and other responsibilities during the same time frame so that you can be recognized appropriately without interrupting the meeting as agendas are usually tight during the meeting. Committee Chairs recognize that you probably have other meetings you attend at the same time and they are always willing to make as much accommodation as they can without totally disrupting the meeting. However, you are probably not the most important thing on the agenda or your presence would have been requested in advance.
3. **PROVIDE** an electronic copy of the written material to the Committee Chair(s) and/or Secretary so that your information can be included in their documentation. You may also bring the written material to the breakfast or committee meeting.
4. **DO NOT READ** any written material you bring. All of our committee members can read.
5. **BE PREPARED** to summarize the **3** most important points. The rest can be read when the committee member gets a chance. This will keep your presentation brief, efficient and highlight the most important things you need to be sure everyone hears.
6. **PLAN** on your presentation taking no longer than 2 – 4 minutes exclusive of discussion or questions by the group. If the Section Head or Committee Chair wants to entertain discussion or questions, it is their choice.
7. If you are a new liaison to the section or committee, leave your contact information with the Section Head and Committee Chair(s) or Secretary.
8. Sign the attendance sheet.

TC4.1 Load Calculation Data & Procedures
Research Subcommittee Meeting
St. Louis, MO
June 26, 2016
America's Center Room 264

1. RP-1681: Low Energy LED Lighting Heat Gain Distribution in Buildings:
 - a. Final report submitted and will be presented for vote tomorrow. Data will be normalized to watts/SF for practitioner use.
 - b. Two paper will come out of research. Researchers will submit two abstract through Glenn Friedman, Glenn will provide a third for a seminar in Long Beach.
2. TRP-1729: Experimental Verification of Cooling Load Calculations for Spaces with Non-Uniform Temperature Radiant Surfaces:
 - a. Glenn (PES Chair) will present recommended contractor to TC tomorrow, 4 very good proposals all under budget. All PES was in agreement on recommended contractor.
3. RP-1742: Update to Measurements of Office Equipment Heat Gain Data:
 - a. First PMS meeting here in STL. Researchers were thinking of testing in field, but PMS wanted actual measurement of each piece of equipment in each mode of operation, i.e. sleep, hibernation etc. Some data will hopefully be available by end of year for potential last minute inclusion in handbook chapter.
4. RP-1414: Fenestration Table Updates:
 - a. Justin Wong provided the fenestration references and data for Table 13 and related narrative to Bruning for handbook. Effort is complete for this cycle.
5. RP-1631: Co-sponsor Kitchen Equipment Testing:
 - a. TC 5.10 has provided updated Table 5a-e along with supporting narrative. Project done and information going into HOF, this can be removed from research list.
6. RP-1699: Climate Data Update:
 - a. Bruning is liaison, research is moving forward. Data is being updated and shared, and expected for inclusion in TC-4.2 chapter in 2017.
 - b. Data for Atlanta has been given to Steve to update our chapter example.
7. Design weather data discussion between Wilkins, Bruning, Wong J and Joe Huang in Atlanta in regards to better defining a design day. Huang has done research and proposes that data presented in current chapter could be better presented for a design day. This appears to be worth pursuing, but need more information from Huang. Can he create an RTAR for further research? There was a co-sponsored seminar in Atlanta using Huang's data, which resulted in notable load result differences (up to 10%), which in turn warrants some further discussion. Huang had a different way to normalize data to create a different peak and daily mean data set. Peak time doesn't always correspond with coincident solar peak? Bruning ran 6 different cities across the globe, and in some cases loads went up and some went down. Need Joe to come up with language for RTAR, Wilkins not sure if this is a research project or not.

8. Pegues reported that Mark Owen (ASHRAE Publications) approached us about outdated publications, i.e. Load Calculation Toolkit. The group agreed that there is still a desire to keep in these types of publications in print due to some unique data included, but a challenge is that the companion software is not compatible with current windows, should disk be removed from publication, or should research project be engaged to update. Spitler suggested that someone confirm that this is "actually" the case, i.e. is this a 16 vs. 32 bit or Fortran compiler issue? The question of whether anyone is still buying it was raised? Justin Wong just bought a copy and will run it on an old computer. Wilkins asked if it can be offered for free, but Spitler thinks it is very unlikely ASHRAE would agree with this. Spitler is also willing to test if Mark Owen can provide a copy, he may be able to re-compile to usable condition. Jim will inquire.

TC 4.1 Programs/Standards Discussion Minutes
St. Louis, Sunday, June 27, 2016

Glenn Friedman, Program Chair

PROGRAMS

1. Current Programs
 - a. St. Louis
 - i. SEMINAR 23 Parting the Clouds to See the Future of Residential Load Calculations, Monday, June 26, 8:00 AM-9:30 AM
 No one can afford the risk of getting load calculations wrong. If load calculations are too fat you lose the job, and if too skinny you have a liability you don't want. This session presents important information about residential loads calculations including their science, the art, their code requirements and their state of the art. The session also presents information about residential load calculation methods in wide use today, explores the impact of technology on how these methods are applied and speculates on the techniques that may underlie "next generation" procedures.
 1. Code Requirements for Residential Load Calculations and Manual J
 Luis Escobar, Associate Member, Home Innovation Research Labs, Upper Marlboro, MD
 2. Residential Load Calculations Using the Heat Balance Method
 Charles S. Barnaby, BEMP, Life Member, Retired, Moultonborough, NH
 3. How New Technologies Are Changing the Way HVAC Residential Load Calcs Are Performed
 Stephen Roth, P.E., Member, Carmel Software Corp., San Rafael, CA
2. Future Program for Las Vegas, Jan 28-Feb 1, 2017
 - a. Seminar and Workshop Submissions Due Date: August 8, 2016. Approved.
 - i. BIM and Load Calculations Seminar Update. Use the ASHRAE Headquarters building existing BIM model. Do in Las Vegas for more time and more attendance. Work with MTG- BIM (MTG=Multidisciplinary Task Group).
 1. Autodesk using in software programs from Carmel loads and EnergyPlus loads. Speaker Krishnan Gowri
 2. Bentley using in software program. Speakers Dru Crawley and Don Shirley
 3. Revit to gbxml export to Trace. Speakers Stephen Roth and Glenn Friedman
 - ii. Support for TC4.2 Seminar Program – Impacts of weather data change in Handbook, and its impact on loads. TC4.2 to take the lead with TC4.1 support for load calculations. Approved.
3. Future Program, June 2017, Long Beach (Long Beach is summer when handbook comes out)
 - a. Future Seminar Session Proposals
 - i. Low Energy LED Lighting Heat Gain Distribution in Buildings Seminar (ASHRAE RP-1681). Approved.
 - a. Chair, Glenn Friedman
 - b. Speaker #1, Ran Liu, PI
 Approach, Test Setup, and LED Luminaire Selection for Testing Led Lighting Heat Gain Distribution

TC 4.1 Programs/Standards Discussion Minutes
St. Louis, Sunday, June 27, 2016

- c. Speaker #2, Xiaohui Zhou
Test Results of LED Lighting Heat Gain Distribution and Comparison to Conventional Lighting
 - d. Speaker #3, Glenn Friedman with Larry Sun's Lighting Group
Load Calculation Design Effects from LED Lighting Heat Gain Distribution Data
 - ii. Seminar on Updates to Load Calculation Handbook Chapter Tables.
Approved.
 - a. Speaker #1 Christian Bach on Testing Method for Office Equipment Heat Gains
 - b. Speaker #2 Christian Bach's grad student on Testing Results Handbook Updates for Office Equipment Heat Gains
 - c. Speaker # Rolando or 5.10 Kitchen Ventilation speaker on Testing Results Handbook Updates for Kitchen Equipment Heat Gains
 - b. Future Program Ideas
 - i. Atrium and large space load calculations, empirical case studies
 - ii. Ventilation and infiltration
 - iii. How Load Calculations Interact with Other ASHRAE Chapters
 - Weather
 - Infiltration
 - Building skin color
 - Ventilation
 - Fenestration, dynamic windows

STANDARDS

1. Still not a lot of actual application of Standard 203.

Las Vegas Conference Tracks

Track 1 Fundamentals and Applications, Chair Chuck Curlin <ccurlin@shultzeg.com>
 Track 2 HVAC&R Systems and Equipment
 Track 3 Water-Energy Nexus
 Track 4 Commercial and Industrial IAQ
 Track 5 Mission Critical Design and Operation
 Track 6 Effects of Climate Change on HVAC&R
 Track 7 Energy Efficient Industrial Buildings
 Track 8 Building Operation and Performance

Dear Chuck:

I wanted to contact you about a seminar TC 41. Load Calculations is planning for Las Vegas. This is a follow up to a seminar we have done twice before very successfully. The topic is BIM to Loads and is about the current state of the art of taking BIM drawings to produce load calculations via different tools and formats. In this round we are looking at direct import from:

1. Revit
2. Bentley

And comparing those to traditional methods:

3. RTS following the ASHRAE Handbook method

TC 4.1 Programs/Standards Discussion Minutes
St. Louis, Sunday, June 27, 2016

4. Gbxml export from BIM to Trane Trace

This seminar has discussed co-sponsoring from the BIM-MTG and TC 1.5 Computer Applications. We also thought we would invite TC 4.7 Energy Calculations to co-sponsor.

We have been working on this program using the ASHRAE Headquarters building so it matches the ASHRAE Handbook load calculation example. We started by creating an updated Revit model right after the January ASHRAE meeting and have been working on the loads and holding monthly conference calls since then. We would like to submit this seminar for Las Vegas through your Track 1: Fundamentals and Applications. We have a lot of effort into this and are very excited about it.

We would appreciate your review and comment. My contact information is below.

We are holding a meeting on site in St. Louis to continue our planning and you are welcome to join us. We are meeting 2-3 pm on Tuesday. I will invite you to attend.



**TC4.1 BIM to
Loads Seminar C...**

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American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.

TC4.1 Load Calculation Data & Procedures
St Louis, Missouri

June 25-29, 2016

Handbook Subcommittee Report

Sunday, June 26, 3:00 PM to 4:00 PM

America's Center Room 264

1. **Handbook Committee Liaison Comments:** David Yuill, Liaison to TC4.1.

2. **Schedule for 2017 HoF Chapters:**
2016 June – Final chapters approved by full TC
 2016 July 12 – Chapter 17 submitted to Yuill/ASHRAE
 2016 July 19 – Chapter 18 submitted to Yuill/ASHRAE
 2017 June – HoF Published

3. **Chapter 18 Non-Residential Loads:**
 - a. Draft of chapter was handed out in meeting for review, could postpone to e-mail ballot if people want more time to review.
 - b. Table 2 Lighting Power Density values will be updated per 90.1-2013.
 - c. Table 3 will be updated per RP-1681 results
 - d. Table 4 will be updated per 90.1-2013 and will include new small motor data. Glenn asked if there was overlap for 1.5, 2 & 3 HP, but it was determined that motor types are different.
 - e. Table 5A/B to be replaced by RP-1631 results, which Rolando was a part of PMS. New text from RP-1631 results will also be included.
 - f. Table 8 & 9 May be able to be updated with RP-1742 results from upcoming Winter meeting as a "correction".
 - g. Table 10 outdated information will be removed, such as cash registers.
 - h. Table 13 has been updated slightly by Jason Wong with new current SHGC information so Window reference can update from 2003 to 2015.
 - i. ASHRAE Building Example still needs update of weather data, so note will be added to qualify result being slightly different than Chapter 14 2017 information. If information can be received in time to slip in on review, Steve will do so.

- j. Bob Doeffinger had hoped to obtain some test results from applying Medical Equipment (Table 6 & 7), but actual tests had not been executed yet. The TC chair had given Bob the Mazzetti/Kaiser plug load paper and there was discussions as to whether to include. Larry mentioned that the author was tough to get a hold of and discussions were complicated. Since this is now a published article we can now include in chapter as we see fit. Committee to review and comment.
- k. New CTS values with more current wall and roof types generated from LCM research CTS generator was passed out and proposed for update of handbook chapter. Someone suggested adding a spray-in foam condition.
- l. From discussion regarding design weather condition RTAR, agreed to add brief note in System Heating and Cooling Load Effects section discussion addressing cooling coil peak loads occurring other than at peak dry bulb/MCWB conditions. Engineers should also check at peak WB and DP conditions.
- m. Generally all in attendance were comfortable with moving forward for TC vote tomorrow at main meeting. So moved by Bruning and seconded by Spitler and approved unanimously.
- n. Steve Bruning noted Jim Pegues had agreed to take over as Handbook Subcommittee Chair for the 2021 revision cycle.

4. **Chapter 17 Residential Loads:**

- a. Review comments were very minor.
- b. Some minor verbal editing.
- c. Some weather data updates to be incorporated, minor coefficient changes.
- d. Work is in progress, but may be a challenge for 7/12 submission. A mail ballot will be necessary, and Chip thinks we need to reach out to David Yuill. Chip to send e-mail to Steve with proposed delay.
- e. Some discussions about cross-references to other chapters. We should try our best to determine if data is updated.

Table 3A LED Lighting Fixtures

Luminaire Category	Space Fraction	Radiative Fraction	Notes
Recessed LED Troffer Partial Aperture Diffuser	0.49 to 0.64	0.37 to 0.47	• Use middle value in most cases.
			• May use higher space fraction for ducted return configuration and lower space fraction for high supply air temperature.
			• May use higher radiant value for ducted return configuration and lower value for large supply airflow rate.
Recessed LED Troffer Uniform Diffuser	0.44 to 0.66	0.32 to 0.41	• Use middle value in most cases.
			• May use higher space fraction for smaller supply airflow rate and lower value for larger supply airflow rate.
			• May use higher radiant value for ducted return configuration and lower value for larger supply airflow rate.
Recessed High Efficacy LED Troffer	0.59	0.51	
Recessed LED Downlight	0.40 to 0.56	0.15 to 0.18	• Use middle value in most cases.
			• May use higher space fraction value for high supply air temperature and lower value for smaller air flowrate.
			• May use higher radiant value for dimming control and lower value for large supply air flowrate.
Recessed LED Retrofit kit 2x4	0.41 to 0.53	0.31 to 0.42	• Use middle value in most cases.
			• May use higher space fraction value for large supply air flowrate and lower value for ducted return configuration.
			• May use higher radiant value for ducted return configuration and lower value for larger supply airflow rate
Recessed LED Color tuning fixture	0.53 to 0.56	0.40 to 0.42	• Use middle value in most cases.
High-bay LED Fixture	N/A	0.42 to 0.51	• Use middle value in most cases.
Linear Pedant LED Fixture	N/A	0.55 to 0.60	• Use middle value in most cases.

Table 3. Total Building Plug and Process Load Power Densities Measured

Measured Facility	Minimum W/ft ²	Minimum W/m ²	Peak W/ft ²	Peak W/m ²	Average W/ft ²	Average W/m ²
San Jose Ambulatory Surgery Center	0.31	3.33	1.04	11.15	0.51	5.44
Fairfield Medical Office	0.21	2.26	0.5	5.41	0.28	3.05
Oakland Medical Office	0.17	1.8	0.44	4.7	0.24	2.6
San Francisco 450 6th Ave Medical Office	0.13	1.45	0.48	5.12	0.2	2.19
San Francisco 2238 Geary Medical Office	0.35	3.75	0.62	6.65	0.45	4.86

Table 4. Plug and Process Load Power Densities by Room Type

Room Type	Design W/ft ²	Design W/m ²	Measured Average W/ft ²	Measured Average W/m ²	Measured Peak W/ft ²	Measured Peak W/m ²
Breakroom/Lounge	3.91	42.09	0.48	5.14	2.92	31.39
Conference/Meeting Areas	1.85	19.91	0.19	2.08	0.41	4.38
Exam/Consultation	1.85	19.91	0.34	3.69	0.63	6.74
Imaging/Linear Accelerator	4.06	43.7	0.65	6.98	1.75	18.80
Lab/Storage	2.86	30.78	0.31	3.72	0.69	7.38
Mechanical/Electrical/Engineering/IT	4.72	50.81	0.94	10.15	1.25	13.40
Offices	1.85	19.91	0.24	2.54	0.66	7.11
Pharmacy/Retail	2.28	24.54	1.19	12.85	2.02	21.74
Prep Area, Pre-Op	5.97	64.26	2.93	31.53	4.67	50.23
Procedure/Operating Rooms/Treatment	5.07	54.57	0.29	3.16	0.92	9.86
Public/Waiting Area	0.31	3.34	0.16	1.76	0.37	3.93
Reception	4.61	49.62	0.9	9.7	2.48	26.72
Workstation/Nurse Station	4.61	49.62	1.36	14.68	2.9	31.17

ison. Departments with less equipment and many exam and consultation rooms have very low power densities. Note the primary care, orthopedic, and podiatry departments. Administration and medical staff areas use more power than exam and consultation spaces. They have a high density of computers, which are more frequently used.

Load Profiles

Figures 1 through 5 show load profiles of spaces. These profiles can be used for energy and cooling load calculations. They also illustrate base versus peak loading. In many cases, base load was surprisingly high. This indicates equipment is being left on during unoccupied hours. It reveals there is a

Table 5. Plug and Process Load Power Densities by Department

Department	Avg W/ft ²	Avg W/m ²	Occupied Hours Avg W/ft ²	Occupied Hours Avg W/m ²	Unoccupied Hours Avg W/ft ²	Unoccupied Hours Avg W/m ²	Peak W/ft ²	Peak W/m ²	kWh/ft ² . yr*
Oncology (Lin- ear Accelerator)	0.58	6.2	0.71	7.64	0.49	5.27	0.88	9.45	5.03
Surgery-OB/ GYN	0.46	4.98	0.74	7.97	0.4	4.31	0.78	8.41	4.04
Admin	0.44	4.75	0.45	4.84	0.28	3.01	0.82	8.83	3.86
Hematology/ Oncology and Infusion	0.38	4.08	0.48	5.17	0.32	3.44	0.65	7.02	3.31
Medical Staff Development	0.29	3.08	0.33	3.55	0.22	2.37	0.45	4.88	2.5
Laboratory	0.25	2.65	0.33	3.55	0.18	1.94	0.44	4.76	2.15
Internal Medicine	0.24	2.55	0.43	4.62	0.16	1.72	0.49	5.29	2.07
Pediatrics	0.22	3.01	0.29	3.12	0.18	1.94	0.43	4.41	1.95
Head and Neck Surgery	0.21	2.31	0.28	3.01	0.18	1.94	0.56	6.02	1.87
Dermatology	0.2	2.11	0.29	3.12	0.15	1.61	0.8	8.60	1.71
Urology, Neurology, EEG	0.16	1.76	0.15	1.61	0.09	0.97	0.37	3.99	1.43
Neurology	0.11	1.17	0.18	1.94	0.04	0.43	0.51	5.53	0.95
Orthopedics and Podiatry	0.08	0.91	0.14	1.51	0.06	0.65	0.31	3.36	0.74
Primary Care	0.07	0.8	0.12	1.29	0.05	0.54	0.18	1.94	0.65

*Annual data is based on one week extrapolated data

significant opportunity to save energy by turning equipment off on nights and weekends. Since running equipment off hours does not benefit patients, this may be an attractive conservation opportunity. Figure 1 shows building load profiles for the five sites during occupied days. Figure 2 shows weekend load profiles.

Figures 3 through 5 show details on one space: the oncology and infusion center in the Oakland facility. Figure 3 shows the department loads. Note that half of the peak load remains present during unoccupied hours. This is fairly significant. For this department, 50% of electricity is consumed outside business hours. Figures 4 and 5 show profiles for two rooms in the department. Equipment at the infusion station remains powered on and ready for use. When used, power draw is only slightly higher than standby power. The profile of an exam room is similar. Use is dominated by the desktop computer, which is always powered on. Other equipment is used infrequently, but has standby power draw.

Total Building Plug and Process Loads

Table 5 lists estimated base and total plug loads and compares them to total building electricity. These values are extrapolated from the measured week's data. Base load calculations assume the minimum measured load. Plug loads in the Fairfield and Oakland MOBs are 11% to 12% of total building electricity. Base loads make up 8% of total electricity. Plug loads in the San Francisco Geary MOB are much higher. They represent 24% of total electricity. Base loads are 18% of total electricity. (The Geary MOB is the high-use facility. It operates seven days a week. The Fairfield and Oakland facilities operate five and six days a week, with shorter business hours.) In all facilities, base plug loads are 60%–75% of total plug load.

CONCLUSIONS AND RECOMMENDATIONS

This study indicates that plug and process loads in MOBs are often overestimated. At a building level, IEEE peak design



ASHRAE Technical Committee 4.1

Agenda for - TC4.1 Load Calculation Data & Procedures

St. Louis
June 27, 2016

TC4.1 Load Calculation Data and Procedures
Monday, 2:15 PM to 4:15 PM
Majestic G, 2nd Floor
Marriott St. Louis Grand Hotel

- | | |
|---|----------------------|
| 1. Call to Order | Jim Pegues |
| 2. Roll Call | Larry Sun |
| 3. Introduction of Visitors | Jim Pegues |
| 4. Approval and/or Corrections to Orlando Meeting Minutes | Jim Pegues |
| 5. Liaison Comments | |
| Section Head | Dennis Wessels, PE |
| Chapter Technology Transfer | Harris Sheinman, PE |
| Research | Prof. Xudong Yang |
| Handbook | David P. Yuill |
| ALI/PDC | Cameron Labunski, PE |
| Standards Liaison | James Dale Aswegan |
| Staff, Research/Tech Services | Michael R. Vaughn |
| Staff, Standards | Stephanie Reiniche |
| 6. Research Subcommittee Report | Bob Doeffinger |
| 7. Programs Subcommittee Report | Glenn Friedman |
| 8. Standards Subcommittee Report | Glenn Friedman |
| 9. Handbook Subcommittee Report | |
| Residential Chap 17 | Chip Barnaby |
| Non-Residential Chap 18 | Steve Bruning |
| 10. ASHRAE Website for TC 4.1 | Jim Pegues |
| 11. Old Business | Jim Pegues |
| 12. New Business | Jim Pegues |
| 13. Adjournment | Jim Pegues |



ASHRAE Technical Committee 4.1

Meetings

TC 4.1 Load Calculation Data and Procedures

Monday 2:15-4:15p
(Majestic G, 2nd Floor, Marriott St. Louis Grand)

TC 4.1 Handbook Subcommittee

Sunday 3:00-4:00p
(Room 264, America's Convention Center Complex, 2nd Floor)

TC 4.1 Research Subcommittee

Sunday 4:00-5:00p
(Room 264, America's Convention Center Complex, 2nd Floor)

TC 4.1 Programs & Standards Subcommittees

Sunday 5:00-7:00p
(Room 264, America's Convention Center Complex, 2nd Floor)

RP-1742 Project Monitoring Subcommittee

Updates to Measurements of Office Equipment Heat Gain Data

Sunday 11:00am-Noon
(Room 264, America's Convention Center Complex, 2nd Floor)

RP-1681 Project Monitoring Subcommittee

Low Energy LED Lighting Heat Gain Distribution in Buildings

Sunday 2:00-3:00pm
(Room 264, America's Convention Center Complex, 2nd Floor)

Seminar 23

Parting the Clouds to See the Future of Residential Load Calculations

Monday 8:00-9:30am
(Room 226, America's Convention Center Complex, 2nd Floor)

Officers and voting members for 2015/2016:

Jim Pegues	Chair	Voting
Robert Doeffinger	Vice Chair, Research SubC Chair	Voting
Larry Sun	Secretary	Voting
Steven Bruning	Handbook Subcommittee Chair	Voting
Glenn Friedman	Standards/Programs SubC Chair	Non-Voting
Chris Wilkins		Voting
Rolando Legarreta		Voting
Jeff Spitler		Voting
Som Shrestha		Voting

TC 4.1 Web Site: <https://tc0401.ashraetcs.org/>