

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: June 11, 2016

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

DATE OF MEETING: January 25, 2016 LOCATION: Orlando, FL

| MEMBERS PRESENT | YEAR APPTD | MEMBERS ABSENT | YEAR APPTD | EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE |
|--|--|---|------------|---|
| Voting Steve Bruning Bob Doeffinger Glenn Friedman Jim Pegues Som Shrestha Jeff Spitler Larry Sun Chris Wilkins Non-Voting Alan Dunlavy Chip Barnaby Dove Feng Dan Fisher Stephen Roth Russell Taylor Branko Todorovic Edmund Wong Justin Wong | 2013 2014 2015 2014 2012 2015 2014 2014 | Voting Rolando Legarreta Non Voting Lucy Amankwah David Ariyo Fred Bauman Alireza Behfar Andrew Braum Sonia Brown Jui-Chen Roger Chang Charlie Curcija Christopher Delgado Philip Farese Joe Ferdleman Doug Hittle Stephen Kavanaugh Ken-Ichi Kimura Elyse Malherek Bryan Morris Gabrielle Powell Ghani Ramdani Brian Rock Ahmed Sleiti Gary Wingfield Kevin Wood | 2015 | Visitors Roelaj Alazazi Christian Bach Carsen Banister Amit Bhansali Enrica Galasso Mitch McDonough Ben Schoenbauer Rachel Spitler |

DISTRIBUTION:
All Members of TC

ADDITIONAL DISTRIBUTION:
 TAC Chairman: Dr. Thomas Lawrence
 TAC Section Head: Dennis Wessels
 Research Liaison: Prof. Xudong Yang
 ALI/PDC: Cameron Labunski, P.E.
 2017 HB Fundamentals: David P. Yuill, P.E.
 Standard Liaison: James Aswegan
 Manager of Standards: Stephanie C. Reinche
 Staff Liaison: Michael R. Vaughn

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

January 26, 2016
Committee Meeting Minutes
TC 4.1 Load Calculations Data and Procedures
Orlando, FL

1. Meeting called to order by Jim Pegues.
2. Roll Call – Secretary Sun
 - a. 8 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 Atlanta minutes as submitted: Steve Bruning
 - i. Second: Som Shrestha
 - ii. Vote 8-0-0 CV
5. Liaison Reports
 - a. Dennis Wessel, Section Head
 - i. ASHRAE encouraging electronic/conf call meetings
 - ii. We can have technical programs in TC meetings. This can be outside program but need to coordinate projector with CEC, session is not recorded.
 - iii. A new website tool is in beta testing.
 - iv. Please submit Roster updates by Tuesday, January 26th
 - v. New 90.1 ECB online tool is available and free
 - vi. TAC is working on a collaborative author handbook tool.

- vii. Remote electronic tie-in to TC meetings is ok. Any vote must be confirmed electronically.
 - viii. All TC websites are updated and there is an easier tool. Contact Joselyn @ ASHRAE Headquarters
- b. David P. Yuill, Handbook liaison
- i. We are doing a great job
 - ii. Chapter 17 due July 12, 2016
 - iii. Chapter 18 due July 19, 2016
 - iv. Bruning asked about RP 1742 results going into online handbook. Yuill, stated that, this goes similar to normal cycle by vote 1st (no deadline), very much encouraged. Get date from contractors for handback G-test research.
- c. Rocky Alazazi – CEC Liaison
- i. Track chair for Global climate change
 - ii. Reaching out for program context
 - iii. Also need reviewers for conference paper
6. Research Subcommittee – Chris Wilkins
- a. Reviewed all projects at subcommittee. See attached handout for Research Subcommittee meeting minutes.
 - b. Design day weather discussion was continued by Joe Hluang.
 - i. Discussion comes from TC-4.2.
 - ii. Design day dynamics have become more evolved from simply design peak value.
 - iii. So much hourly data is available now so why not do more frequent analysis for 24 hour design day profiles.
 - iv. More interest from TC - 4.1 than TC - 4.7, there is a lot of concern with new data as identified in seminars here..
 - v. Joe is drafting a WS and can send to us.

- vi. Bruning initially thought this was not big impact, but turns out it had big impact of up to 10% in the ASHRAE HQ example.
- vii. Friedman asked about impact to RTS...Bruning responded not much. Just storage of data, no method impact.
- viii. Huang – Commented that big difference is in profiles & solar values and wind speed.
- ix. WS is focused on impacts of applying data to load calcs. The data is already there.
- x. Important for RTAR to delineate data gathering methods. Huang described the difference in his methodology (not 0.4% but actual peak temp) therefore more of actual temperature impacts.
- xi. TC. 4.2 involve is critical RTAR first.

7. Programs/Standards Subcommittee Report – Glenn Friedman

- a. See attached handout for Programs/Standards Subcommittee Meeting Minutes Programs.
- b. Programs at this meeting
 - i. Seminar 24 load calculations Back to Basics was a success with 150 attendees.
- c. Other Programs
 - i. Put forward residential load calculations again
 - ii. BIM MTG program – similar to previous BIM – LOAD presentations. No motion at this time, next meeting.
- d. Motion for St. Louis Programs: Chris Wilkins
 - i. Second Bruning.
 - ii. Vote 7-0-0 can passed.

8. Standards

- a. No new standards at this time
- b. Standards SPC-203 Method of Test for Determining Heat Gain of Office Equipment is published and we should try to push it out to “equipment” industry for uniform testing.

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. Updating tables is most critical and useful to members. Minutes reflect those who will do updates and schedule, research seems to be on track for inclusion. Other updates as noted in minutes are critical.
- c. Chapter 17: Chip Barnaby is reviewing some comments
 - i. Comments are minor
 - ii. Cross reference to other chapters
 - iii. Some discussions with TC-1.12 re: latent load conditions.
- d. Chapter 18:
 - i. Walked thru chapter in subcommittee
 - ii. RP 1681 data will be available for inclusion
 - iii. RP1631 data will be available for inclusion
 - iv. It is good that we are updating data based on actual ASHRAE research
 - v. Unfortunately RP1742 will not make it for 2017 HOF. Data can be updated in the handbook online but will not be official until actual printing. 7-8 attendees use HOF online. Article for journal will be available 3 – 4years.
 - vi. Justin will update Table 13
 - vii. Bruning is updated CTS values from HOF software. Will have original walls/roofs + walls/roofs with insulation.
 - viii. Draft out by June 1 with approval at St. Louis

10. TC 4.1 Web Site

- a. Website is updated to current ASHRAE model
- b. See agenda for website address
- c. Jim asked for suggestions for improvements

11. New Business

- a. Justin Wang RP-1414 attended PMS meeting. Contractor has asked about frame type (flush or recessed). Looks like 2 year project.
- b. Bruning recognized all new young members and encouraged them to become a corresponding member since this TC is a very fundamental contributor to ASHRAE work.

12. Executive Session

- a. RP-1742
 - i. Recommendation from PES is bid from OSU.
 - ii. Motion Glenn Friedman
 - iii. Second Bob D.
 - iv. Vote: 7-0-1-1
- b. Glenn is PES chair, Chris, Dave & Elyse on PES.

13. Motion to Adjourn: Som Shrestha

- Second: Glenn Friedman
- Vote: 7-0-1, 1 absent, CV

Attachments:

1. Research Subcommittee Report
2. Programs/Standards Subcommittee Report
3. Handbook Subcommittee Report
4. Orlando Agenda
5. Sign-In Sheet

TC4.1 Load Calculation Data & Procedures
Orlando, Florida
January 23-27, 2016
Research Subcommittee Report
Sunday, January 24th
Hilton Orland, Ruby Lake

1. RP-1681: Lighting Heat Gain:
 - a. Doeffinger reported testing is done, PI is moving back to China, but someone else is taking over.
 - b. Data has been provided at this meeting, and they want to know about any re-testing requirements so they can move on with facility. Work will be done by April 2016 in a format to include in HOF Chapter 18.
 - c. Generally heat gain to the room is less than expected (50%) and the radiant/convective split is more radiant. A journal article is being pushed.
2. TRP-1729: Radiant Cooling Surfaces:
 - a. This has been approved by RAC and is in the cue for funding. It will likely will be funded in the next cycle. Was passed over last cycle, but we got RP-1742 approved.
3. RP-1742: Plug Load Updates:
 - a. Friedman is PES and committee will vote tomorrow. 7 bidders of very high quality submitted bids.
4. RP-1414: Fenestration Table Updates:
 - a. Justin Wong reported that an update is more likely for HOF 2021 by TC-4.5 (Chapter 15).
 - b. Table 1, 4 & 10 may be updated for 2017 HOF disk, but not sure how it will be published in 2021.
 - c. Justin asked to be our Liaison from TC-4.1, this is an action for the Chair (Pegues). Justin is endorsed by TC-4.5 and is geographically in the right area.
 - d. Tables are nearly 20 years old, many software updates include algorithm updates, and glazing technologies have changed. Data will look at more current glazing combinations.
5. RP-1631: Co-sponsor Kitchen Equipment Testing:
 - a. Bruning reported that research results are being presented at this meeting.
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 Subcommittee Discussion Minutes
Orlando, Sunday, January 24, 2016

Glenn Friedman, Program & Standards Chair

PROGRAMS

1. Current Programs
 - a. Orlando
 - i. Back to Basics: The Science, Application and Art of Load Calculations. Monday, January 25, 8:00 AM-9:30 AM, SEMINAR 24 (BASIC), Room: Orange Ballroom D
 1. Science: New ASHRAE Load Calculations User's Manual and the current overview of load calculations, by Jeff Spitler
 2. Application: Zoning and load calculation basics, what do you do early in design when you don't have all the answers, by Larry Sun
 3. Art: Case studies, horror stories, what to watch for, and odd-ball cases, by Steve Bruning
 - ii. Double Skin Façade Design and Application, SEMINAR 50 (INTERMEDIATE) Tuesday, January 26, 11:15 AM-12:45 PM, Room: Orange Ballroom D
 1. Thermal Performance of Double Skin Façade with Buoyancy Driven Airflow, John Zhai, Ph.D., Member, University of Colorado, Boulder, CO
 2. Experimental and Numerical Appraisal of the Application of a Double Skin Façade in Moderate Climate, Aleksandar Andjelkovic, Ph.D., Associate Member, University of Novi Sad, Faculty of Technical Sciences, Novi Sad, Serbia
 3. Double Façade Influence on Heating and Cooling Load: Three Models for Calculation of Interspace Temperature, Tanja Cvjetkovic, P.Eng., Delhaize Group, Belgrade, Serbia
 4. Assessment of Climatic Parameters Inside Experimental Room Equipped with Box Double-Skin Façade, Gabriel Nastase, Ph.D., Associate Member, Transilvania University From Brasov, Brasov, Romania
 - iii. Peak Envelope Cooling Loads: How Did We Get to Today? Is This Where We Want to Be? SEMINAR 52 (INTERMEDIATE), Tuesday, 11:15 AM-12:45 PM, Room: Orange Ballroom G
 1. History of Peak Envelope Cooling Load Methods in the U.S. Jeff Haberl, Ph.D., BEMP, Fellow ASHRAE, Texas A&M University, College Station, TX
 2. Overview of Peak Envelope Cooling Load Methods Using the RTS Method, Jeffrey Spitler, Ph.D., P.E., Fellow ASHRAE, Oklahoma State University, Stillwater, OK
 3. An Architect's Perspective of U.S. Envelope Peak Cooling Load Methods, Walter T. Grondzik, P.E., Fellow Life Member, Ball State University, Muncie, IN
 4. Overview of Australian Envelope Peak Cooling Load Methods, P.C. Thomas, Team Catalyst, Sydney, Australia
 - a. Seminar and Forum Due Date: February 8, 2016
 - iv. Residential Loads: Title: Residential Load Calculations: Methods, Tools, and Trends Track: Modern Residential Systems Overview: The session presents information about residential load calculation methods in wide use today,
2. Future Programs for St. Louis, Jun 25-29, 2016
 - a. Seminar and Forum Due Date: February 8, 2016
 - iv. Residential Loads: Title: Residential Load Calculations: Methods, Tools, and Trends Track: Modern Residential Systems Overview: The session presents information about residential load calculation methods in wide use today,

TC 4.1 Programs/Standards Subcommittee Discussion Minutes
Orlando, Sunday, January 24, 2016

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: Luis Escobar, Associate Member, Air Conditioning Contractors of America (ACCA), Arlington, VA
 2. New Heat Balance Method: Charles S. Barnaby, BEMP, Life Member, Retired, Moultonborough, NH
 3. New Technologies: Stephen Roth, P.E., Member, Carmel Software Corp, San Rafael, CA.
- v. Work with MTG- BIM (MTG=Multidisciplinary Task Group). Roth for gbxml conversion talk. John Kennedy alleges there are improvements. Discuss what value it has in BIM to Load. Is it working? Should this “BIM in Practice” be an MTG BIM seminar rather than a TC4.1 seminar (Chris Wilkins). Voted and approved. (St. Louis or Las Vegas)
- vi. Other Ideas
3. Future Program Ideas, 2017 Jan 28-Feb 1 – Las Vegas
- a. Future Seminar Session Proposals
- i. BIM and Load Calculations Seminar Update, Bruning, Wilkins, Gowri. Use the ASHRAE Headquarters building existing BIM model. Do in Las Vegas for more time and more attendance.
 1. Hand and actual measured loads. Bruning with support from OSU Dan Fisher
 2. Autodesk using in software programs for Carmel loads and EnergyPlus loads. Gowri
 3. Bentley using in software program. Crawley
 4. Revit to gbxml export to Trace. Roth/Friedman
 - ii. LED lighting loads from RP 1681
 - iii. Atrium and large space load calculations, empirical case studies
 - iv. Ventilation and infiltration
 - v. How Load Calculations Interact with Other ASHRAE Chapters
 - Weather
 - Infiltration
 - Building skin color
 - Ventilation
 - Fenestration, dynamic windows
- b. The following is a summary of Program Tracks for the Las Vegas meeting:
- **Track 1: Advances in Refrigeration Systems and Alternative Refrigerants**
Track Chair: Frank Schambach
Email: frankschambach@mindspring.com
This track seeks papers and programs that explore the wide range of refrigeration systems under development with special emphasis on the use of alternative refrigerants in vapor compression machines to address environmental concerns.
 - **Track 2: Research Summit**
Track Chair: Jeffrey Spitler
Email: spitler@okstate.edu
The fourth annual Research Summit seeks papers that report results on any aspect of ASHRAE-related research including heating, cooling, ventilation, other energy uses in the engineered environment and associated environmental aspects.
 - **Track 3: Fundamentals and Applications**
Track Chair: David E. Claridge
Email: dclaridge@tamu.edu

TC 4.1 Programs/Standards Subcommittee Discussion Minutes
Orlando, Sunday, January 24, 2016

Fundamental information and applications of fundamentals related to all aspects of HVAC&R are welcome. This can range from psychrometric properties and processes to combustion, controls, HVAC system and envelope fundamentals and beyond.

- **Track 4: HVAC Systems and Equipment**

Track Chair: Alan Neely

Email: alan_neely@pghcorning.com

This track will include presentations on best practices to implement traditional, non-traditional, and hybrid approaches to achieve successful HVAC&R systems design. Objectives include high performance systems and equipment, LEED certified designs and sustainable buildings.

- **Track 5: Smart Building Systems/Remote Monitoring and Diagnostics**

Track Chair: Samir Traboulsi

Email: traboulsi.samir@gmail.com

Smart buildings address HVAC&R equipment operation (chiller sequencing, soft start), integration into complete systems and can potentially interface with multiple building complexes and micro grid operation. This track includes papers on advanced communication protocols, system integration, BMS tools, data management and analysis.

- **Track 6: Indoor Environment: Health, Comfort, Productivity**

Track Chair: Dennis Alejandro

Email: denzjac@yahoo.com

Buildings and other enclosed spaces are increasingly required to provide safe, healthy environments in an energy efficient manner. Papers in this track will review the balance between environmental health and energy efficiency in buildings and help define future education, policy and research directions.

- **Track 7: Professional Skills Beyond Engineering**

Track Chair: Rachel Romero

Email: rachel.romero@nrel.gov

This track seeks to ensure professional skills are being developed and maintained beyond engineering essentials. Emphasis will be placed on meeting the professional development and business needs of today and converting them into the building blocks of tomorrow's success.

- **Track 8: Renewable Energy Systems and Net Zero Buildings**

Track Chair: Kevin Gallen

Email: kevin@gallenengineering.com

Wind, hydroelectric and solar are just a few of the alternative and/or renewable energy sources that are being used in HVAC design as we strive for Net-zero and high efficiency buildings. This track will address recent advances in alternative energy systems and equipment and new design strategies for achieving Net-zero buildings.

STANDARDS

1. There are no updates on Standards activities at this time.
2. Standard SPC-203 Method of Test for Determining Heat Gain of Office Equipment is published and we should try to push it out to "equipment" industry for uniform testing Current Programs



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TC4.1 Load Calculation Data & Procedures

Orlando, Florida

January 23-27, 2016

Handbook Subcommittee Report

Sunday, January 24, 3:00 PM to 4:00 PM

Hilton Orlando, Ruby Lake

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

2. **Schedule for 2017 HoF Chapters:**
 - 2015 June – Rough draft overall chapters
 - 2016 January – Full draft overall chapters reviewed by Handbook subcommittee
 - 2016 April – Deadline for new research results to be incorporated in 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 17 Residential Loads:**
 - a. Review from Jaya Mukhopadhyay – Chip Barnaby has evaluated and will incorporate numerous clarifications.
 - b. Chip received comments from TC1.12 related to residential latent heat gains. He will review their draft chapter and work with them to identify appropriate text to incorporate.
 - c. Target is to have draft distributed to TC by June 1 and final approval at June meeting in St Louis.

4. **Chapter 18 Non-Residential Loads:**
 - a. First Draft Markup Review - Steve Bruning distributed first draft mark-up. Subcommittee reviewed mark-up page by page. Bulk of changes are in tables, not text.
 - b. 1681 PMS met to review work on LED heat gain. Contractor will provide results in format similar to existing Table 3 by April. Bob Doeffinger, PMS Chair, will follow up.

- c. Agreed to add table 10.8-4 from Standard 90.1-2013 with fractional/small horsepower motors for small equipment heat gain.
- d. Results from RP 1631 on kitchen equipment heat gain are complete and updated data based on those tests was distributed. This will be used to update Tables 5A and 5B. Where a piece of equipment in the current tables was not tested, the old data will be retained and source annotated.
- e. Bob Doeffinger will follow up with TC 8.6 for any updates to Table 6 on medical equipment. Although out-of-date, agreed to leave as is for this cycle if no better data found.
- f. Likewise, for Table 7 on lab equipment, Chris Wilkins will contact TC 9.11 but doubts expressed whether generalizations possible. Will leave table as is for this cycle if no better info found.
- g. RP 1742 for office equipment heat gain contractor selection will occur at this meeting, but none of the contractors schedules proposed will have data available for this handbook cycle. Tables 8-12 will remain unchanged until that work is complete.
- h. Larry Sun has contacted authors of Kaiser study of plug loads for medical office buildings and will continue pursuit of data which might be helpful.
- i. Justin Wong will update Table 13 with current version of Window. He is coordinating with TC 4.5 efforts.
- j. Update to CTS and RTS tables – will use Load Calculation Manual tools to recalculate. Walls and roofs will be updated to reflect higher insulation values per 90.1-2013. A mix of existing data, updated construction meeting current 90.1-2013.. Steve Bruning presented initial results from roof CTS update. Found very good agreement between current tabulated Handbook values (created with 1999 Load Principles HBFort program) and the latest RP 1616 Load Calculation CTS spreadsheets. Same process will be done for upgraded wall insulation CTS and typical zone RTS.
- k. Chapter variables list review – Jim Pegues will mark up chapter to incorporate standardization of equation terms presented at the last meeting .
- l. Steve Bruning will check need for fan heat reference versus text on following page. Can it be deleted? Update all references to other chapters in Table 25.
- m. Target is to have draft distributed to TC by June 1 and final approval at June meeting in St Louis.



ASHRAE Technical Committee 4.1

Agenda for - TC4.1 Load Calculation Data & Procedures

Orlando
January 25, 2016

TC4.1 Load Calculation Data and Procedures
Monday, 2:15 PM to 4:15 PM
Lake Eola B, Lobby Level
Hilton Orlando Convention Center

- | | |
|---|---|
| 1. Call to Order | Jim Pegues |
| 2. Roll Call | Larry Sun |
| 3. Introduction of Visitors | Jim Pegues |
| 4. Approval and/or Corrections to Atlanta Meeting Minutes | Jim Pegues |
| 5. Liaison Comments Section Head Chapter Technology Transfer Research Handbook ALI/PDC Standards Liaison Staff, Research/Tech Services Staff, Standards | Dennis Wessels, PE Harris Sheinman, PE Prof. Xudong Yang David P. Yuill Cameron Labunski, PE James Dale Aswegan Michael R. Vaughn Stephanie Reiniche |
| 6. Research Subcommittee Report | Chris Wilkins |
| 7. Programs Subcommittee Report | Glenn Friedman |
| 8. Standards Subcommittee Report | Glenn Friedman |
| 9. Handbook Subcommittee Report Residential Chap 17 Non-Residential Chap 18 | Chip Barnaby 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
(Lake Eola B, Lobby Level)

TC 4.1 Handbook Subcommittee

Sunday 3:00-4:00p
(Ruby Lake, Lobby Level)

TC 4.1 Research Subcommittee

Sunday 4:00-5:00p
(Ruby Lake, Lobby Level)

TC 4.1 Programs & Standards Subcommittees

Sunday 5:00-7:00p
(Ruby Lake, Lobby Level)

TC 4.1 RP-1681 Project Monitoring Subcommittee Low Energy LED Lighting Heat Gain Distribution in Buildings

Sunday 2:00-3:00pm
(Ruby Lake, Lobby Level)

Seminar 24

Back to Basics: The Science, Application and Art of Load Calculations

Monday 8:00-9:30am
(Orange Ballroom D, Lower Level)

Seminar 50

Double Skin Façade Design and Application

Tuesday 11:15am – 12:45pm
(Orange Ballroom D, Lower Level)

Seminar 52

Peak Envelope Cooling Loads: How Did We Get to Today? Is This Where We Want To Be?

Tuesday 11:15am – 12:45pm
(Orange Ballroom G, Lower Level)

Officers and voting members for 2015/2016:

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

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

Russell Taylor

CM

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TC 4.1 Sign-In Sheet - Orlando January 2016

| YEA | Name | Status | Affiliation | E-mail |
|-----|------------------|-------------|----------------------------------|--------------------------------|
| 1 | LARRY SUN | MR | tkisc | lsun@tkisc.com |
| 2 | Bob Doeffinger | MR | ZMM | red@zmm.com |
| 3 | Justin Wong | CM | Und lease | wongjstn@gmail.com |
| 4 | Chip Barabky | CM | Ind. consultant | chipbarabky@gmail.com |
| 5 | Sam Shrestha | VM | ORNZ | shresthas@ornz.gov |
| 6 | Dave Feng | | Taylor Engineering | d.feng@taylor-engineering.com |
| 7 | Glenn Friedman | NVM | Taylor Engineering | |
| 8 | Chris Wilkins | VM | CRB Consulting Eng. | chris.wilkins@crbusa.com |
| 9 | Mitch McDonough | - | Student Visitor | mitchmcd@iastate.edu |
| 10 | Christian Bach | - | Visitor | cbach@okstate.edu |
| 11 | BEN SCHOENBAUER | Guest | CENTER FOR ENERGY FLOW | B.SCHOENBAUER@UNCFE.ORG |
| 12 | DAN FISHER | CM | OSU | d.fisher@okstate.edu |
| 13 | Rachel Spitzer | Guest | Cyntergy | rspitzer@cyntergy.com |
| 14 | Jeff Spiller | Member | OSU | spiller@okstate.edu |
| 15 | Steve Bruviny | Member | Newcomb Boyd | sbruviny@newcomb-boyd.com |
| 16 | Alan Dualany | Member | S-E-A, Limited | adualany@sea-limited.com |
| 17 | Amit Bhansali | Guest | WSP; DALLAS | amitb@ccrd.com |
| 18 | JIM ARGUES | VM | CARNIA | James.T.Argues@COMNET.UTL.COM |
| 19 | Stephan Roth | NVM | Carmel | srth@carmelsoft.com |
| 20 | BRANKO TODOROVIC | Corep. memb | Serbian Society HAC | todorob@eunet.rs |
| 21 | CARSEN BANISTER | Guest | National Research Council Canada | carsen.banister@nrc-cnrc.gc.ca |
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