



**1791 Tullie Circle, N.E./Atlanta, GA 30329
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TC/TG/MTG/TRG MINUTES COVER SHEET

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

TC/TG/MTG/TRG No. TC 2.6 DATE March 15, 2017

TC/TG/MTG/TRG TITLE Sound and Vibration Control

DATE OF MEETING January 30, 2017 LOCATION Las Vegas, Nevada

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Voting members: Hassler, Robert Hooti, Matthew LaForgia, Dan Marks, Patrick Meeuwsen, Greg Papadimos, Chris Prime, Raj Swan, Jason Corresponding members: Copley, Lawrence Dunlap, John Eichelberger, Curt Ganesh, Radha Horesco, Joseph Keith, Reginald Kline, Jim Kowald, Will Lilly, Jerry Meeuwsen, Greg Meisel, Paul Michaud, Alexander Miller-Klein, Erik Mitchell, Andrew Osborn, Kim Peppin, Richard Peterman, Karl		Voting members: Bridger, Joseph Murello, Matthew Corresponding members: Alkhalil, Rami Babich, Jeffrey Bastasch, Mark Berardi, Umberto Blum, Nathan Boldt, Jeffrey Broner, Norman Busch, Todd Bushnell, Peter Carroll, David Chinoda, Zvirimumwoyo Clemente, Victor Cuff, Nicole Desai, Ashish Deveci, Martin Eaton, Erroll Eligator, Ronald Fly, Mark Froehlich, Michael Gaghan, Kevin George, Jason Goodfriend, Lewis		Guests: Bernal, Juan Brooks, Joe Bulookbashi, Ladan Caldwell, Trevor Campbell, Scott Cincotti, Franco Hawkins, Russell Hightower, Kenny Hopkins, Larry Iacobellis, John Mathson, Tim McClary, Doug Mezache, Macinissa Saenz-Acosta, Karina Schwob, Michael Shafer, Benjamin Stegall, Jack Tyson, Terence Waters, Angela Woodford, Michael Yen, Jaime

<p>Corresponding members (continued):</p> <p>Reynolds, Douglas</p> <p>Roy, Kenneth</p> <p>Simmons, Robert</p> <p>Wang, Zhiping</p> <p>Warick, Don</p> <p>Wise, Steve</p> <p>Wowk, Roman</p> <p>Zimmerman, Randal</p> <p>Provisional corresponding members:</p> <p>Deibler, Nate</p> <p>Miller, Jane</p>		<p>Corresponding members (continued):</p> <p>Guenther, Brian</p> <p>Guney, Ali Kemal</p> <p>Hallstrom, Arthur</p> <p>Herfat, Ali</p> <p>Keating, Michael</p> <p>Khati, Manoj</p> <p>Kloostra, Marvin</p> <p>Lai, Kevin</p> <p>Lau, Eddie</p> <p>Lilkendey, Robert</p> <p>Maruthuria, Parag</p> <p>Mattocks, Charles</p> <p>Meredith, Dustin</p> <p>Miller, Gregory</p> <p>Mohamed, Ahmed</p> <p>Muehleisen, Ralph</p> <p>Nepomuceno, Jose</p> <p>Pappas, John</p> <p>Pooler, James</p> <p>Resetar, Michael</p> <p>Reynolds, Brian</p> <p>Rockwood, William</p> <p>Ronsse, Lauren</p> <p>Ryherd, Erica</p> <p>Sachwald, Benjamin</p> <p>Sardar, Asad</p> <p>Schaffer, Mark</p> <p>Shook, Ken</p> <p>Simcoe, Tim</p> <p>Sofra, John</p> <p>Spencer, Michael</p> <p>Stewart, William</p> <p>Sturm, Eric</p> <p>Sylvestre-Williams, Nicholas</p> <p>Wang, Jack</p> <p>Wang, Lily</p> <p>Weinstein, Jonathan</p> <p>Zybura, Jack</p> <p>Provisional corresponding members:</p> <p>Long, Mark</p> <p>Mahmoud, Mahmoud</p> <p>Stockmans, Jeremy</p>		
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		Provisional corresponding members (continued): Tripathi, Ashish Wang, John		
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DISTRIBUTION: <i>All Members of TC/TG/MTG/TRG plus the following:</i>	
TAC Section Head:	Bert Phillips
All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters (Research, Standards, ALI, etc.)	Pawel Wargocki Cyrus Nasser Michael Vaughn
Mike Vaughn, Manager Of Research & Technical Services	MORTS@ashrae.net

ASHRAE TC 2.6 Sound and Vibration Control

Main Committee Meeting Agenda

2:15-4:15 PM Monday, January 30th 2017

Pompeian IV– Caesar's Palace Las Vegas NV

NOTE: All Task Group Chairs and Subcommittee Chairs are asked to submit written report to the Secretary (Andrew Mitchell) before Friday February 17th 2017.

- 1. Call to order (LaForgia) [3 minutes]**
 - 1.1. Read scope of TC 2.6
 - 1.2. ASHRAE Code of Ethics statement: "The ASHRAE Code of Ethics is to be adhered to by those doing ASHRAE business whether or not they are an ASHRAE member (www.ashrae.org/about-code-of-ethics)."
 - 1.3. Additions and/or modifications to the agenda
- 2. Introduction of those present (LaForgia) [5 minutes]**
 - 2.1. Welcome new members and visitors
- 3. Confirmation of current voting members (Schwob/Mitchell) [3 minutes]**
- 4. Review and approval of the minutes (Mitchell) [3 minutes]**
 - 4.1. **Jason Swan (1st), Patrick Marks (2nd), 7-0-0-3-CNV**
- 5. Secretary's report (Mitchell) [3 minutes]**
- 6. TC Chair's meeting report (LaForgia) [5 minutes]**
 - 6.1. All Task Group Chairs and Subcommittee Chairs are asked to submit written report to the Secretary (Andrew Mitchell) before Friday February 17th 2017.
- 7. Chair's announcements and correspondence (LaForgia) [3 minutes]**
- 8. Subcommittee reports (written reports to be provided to Secretary)**
 - 8.1. Research Subcommittee (Meeuwsen) [20 minutes]**
 - 8.1.1. Research Chair's meeting report
 - 8.1.2. Ongoing research projects
 - 8.1.2.1. RP-1408 The effect of lining length on the insertion loss of acoustical duct liner with PI Reynolds/UNLV (Lilly)
 - 8.1.2.1.1. Two (2) of the PMS members have left; Reggie Keith has volunteered to assist and is now a member of the PMS.
 - 8.1.2.1.2. Have received a second draft of the final report and expect to receive a third draft in approximately 1-month (March 2017).
 - 8.1.2.1.3. Expect to receive final report in June 2017.
 - 8.1.2.2. [Blank]
 - 8.1.2.3. [Blank]
 - 8.1.3. Work Statements/RTAR's/URP's
 - 8.1.3.1. RTAR-1707 Annoyance Threshold of Tones in Noise as related to building services equipment (J. Swan)
 - 8.1.3.1.1. Developed by Lily Wang. We have until May 15, 2017 to complete. Jason Swan is now taking the lead.
 - 8.1.3.2. RTAR- 1754 Developing the standard test method for Dynamic Characteristic of Vibration Isolators (G. Meeuwsen)
 - 8.1.3.2.1. Work statement is nearly complete; Greg Meeuwsen is reviewing for format, etc.
 - 8.1.3.3. RTAR xxxx Speech privacy in high performance buildings (Miller-Klein)
 - 8.1.3.3.1. Erik Miller-Klein is taking over Ken Roy's work; has not yet been submitted and is therefore not a number at this time.
 - 8.1.3.4. RTAR xxxx Inlet and Outlet System Effects on Multiple Plenum Fans in a Parallel Arrangement (Fan Arrays) for Air and Sound Performance Co-Sponsor with TC 5.1 (K. Osborne)

- 8.1.3.4.1. This project is similar to projects for other fan types; looking at inlet and outlet arrangements and their influence on performance and sound.
- 8.1.3.4.2. Motion to co-sponsor RTAR with 5.1, **Patrick Marks (1st), Jason Swan (2nd), 7-0-0-3-CNV**
- 8.1.4. Topics for future research
 - 8.1.4.1. Isolator performance in terms of how we might reach a point of predicting what might happen in the built environment. Have decided to focus on two (2) elements:
 - 8.1.4.1.1. Characterizing vibration force of mechanical equipment.
 - 8.1.4.1.2. Characterizing roof/floor support structure for mechanical impedance.
- 8.2. **Programs Subcommittee** (Miller K) [15 minutes]
 - 8.2.1. Program Chair's meeting report
 - 8.2.2. Programs this meeting
 - 8.2.2.1. Hot topics this meeting
 - 8.2.2.1.1. Mechanical Equipment Vibrations and Structural Interaction (Roman Wowk and Chris Papadimos).
 - 8.2.3. Potential programs next meeting – Long Beach CA
 - 8.2.3.1. Two (2) programs for Long Beach, both seminars, for the residential tract of standards, codes and guidelines:
 - 8.2.3.1.1. Relevance of tones and remediate of tones in residential.
 - 8.2.3.1.2. Current levels of standards and codes for residential buildings (IBC, HUD, 189.1, ISO).
- 8.3. **Publications Subcommittee** (Wise) [10 minutes]
 - 8.3.1. Handbook chapters
 - 8.3.1.1. Handbook Applications 2019 (Wise)
 - 8.3.1.2. Handbook Fundamentals 2017 (Wise)
 - 8.3.2. Other publications
 - 8.3.2.1. Practical Guide to Sound & Vibration Control
 - 8.3.2.2. Application of Manufacturers' Sound Data
 - 8.3.3. Web page (Schwob)
- 8.4. **Standards Subcommittee** (Bridger) [20 minutes]
 - 8.4.1. SPC 130 – Method of Test for Rating Ducted Air Terminal Units (Zimmerman)
 - 8.4.1.1. This is completed and the new standard is in the bookstore. This includes new language, clarified terminology, and test procedures for radiated and exhaust damper sound levels (i.e. terminal units for controlling exhaust in room).
 - 8.4.2. SPC 189.1 – Design for High Performance Green Buildings (Miller-Klein)
 - 8.4.2.1. Approximately fifteen (15) comments from public review that are being addressed tomorrow to working group 8 on 1/31. Uploaded to digital version soon; full print expected by the end of 2017.
 - 8.4.3. SPC 200 – Method of Test for Chilled Beams (Zimmerman)
 - 8.4.3.1. Met today (1/30); the standard is in the bookstore, but omissions were discovered. These are being revisited, and considering revisions to the method of determining induction rate of chilled beams. There has been discussion over whether multiple methods would be allowed to determine the rate. Work is still in progress.
 - 8.4.4. Updates from Other Standards Organizations
 - 8.4.4.1. AHRI (Abbate)

- 8.4.4.1.1. AHRI work on the following standards is in progress and near completion:
 - 8.4.4.1.1.1. **New AHRI Standard 375:** Application of Sound Rating Levels of Large Air-cooled Outdoor Refrigerating and Air-conditioning Equipment
 - 8.4.4.1.1.2. **Update to ANSI/AHRI Standard 260 (I-P) and 261 (SI)-2012:** Sound Rating of Ducted Air Moving and Conditioning Equipment
 - 8.4.4.1.1.3. **Update to ANSI/AHRI Standard 575-2008:** Method of Measuring Machinery Sound within Equipment Space/ almost reaffirmation
- 8.4.4.1.2. The AHRI Air Handling Unit (AHU) Subsection working group is finalizing a feasibility report to determine if a certification program for sound testing of AHU is viable based on AHRI Standard 260. The report will be presented to the AHU Subsection by early March to form a working group to draft the operations manual of the certification.
- 8.4.4.1.3. AHRI has a contract with Nebraska University to conduct a study for determining bias and reproducibility of sound power test methods within the HVACR industry, which is currently in progress and manufacturing labs are producing data based on the following test methods:
 - 8.4.4.1.3.1. Diffuse field method: AHRI 220
 - 8.4.4.1.3.2. Free field method: ISO 3744
 - 8.4.4.1.3.3. Intensity method: ISO 9614-2
- 8.4.4.2. AMCA (Brooks)
 - 8.4.4.2.1. AMCA Standard 210/ASHRAE 51 has been approved since the last meeting.
 - 8.4.4.2.2. Finished reviewing and revising AMCA 99; definitions.
 - 8.4.4.2.3. Completed periodic review of sound rating of fans; no major changes.
 - 8.4.4.2.4. Next year expect to conduct periodic review of AMCA 300 (sound rating of fans).
- 8.4.4.3. ANSI (Ali Herfat)
 - 8.4.4.3.1. New working group to develop standard for physical education facilities including gymnasiums, natatoriums. Will meet at ASA in the spring in Boston, MA.
 - 8.4.4.3.2. S12.51 being reaffirmed.
 - 8.4.4.3.3. Changes taking place in ANSI standard to allow PC based instruments in laboratories.
- 8.4.4.4. ASTM (Peppin); E33 (Lilly)
 - 8.4.4.4.1. Round robin in E90 (has not yet started).
 - 8.4.4.4.2. Round robin in ASTM E477. (5 of the 6 participating laboratories have submitted data to ILS; waiting for the sixth to complete the round robin).
 - 8.4.4.4.3. C423 round robin is nearing completion.
 - 8.4.4.4.4. E2964, E336 round robin end of February in Chicago. Standard for DTC, ASTC, NIC at the Masonite facility in Chicago. Testing how repeatable the standard is by having consultants conduct testing.
- 8.4.4.5. ISO (Reynolds); ISO TC205/TC43.2 (Roy)

- 8.4.4.5.1. TC 205/TC 43. Had vote on standard workgroup 27, rejected; didn't meet timeline of ISO.
- 8.4.4.5.2. ASHRAE 171 went through public review method of testing seismic restraints; 1 comment received, discussed Tuesday morning, expecting publication soon. Moved from static test to dynamic push/pull over multiple cycles.
- 8.5. **Standing Subcommittees** [10 minutes]
 - 8.5.1. Vibration Isolation (M Hooti)
- 8.6. **Operations Subcommittee** (LaForgia) [15 minutes]
 - 8.6.1. Honors and awards (Miller-Klein)
 - 8.6.1.1. John Dunlap just received fellow ASHRAE.
 - 8.6.2. Long range planning (LaForgia)
 - 8.6.2.1. Intend to create structure for long range planning; planning phone call to establish structure and timeline (membership, technical) to establish deadlines, etc. Approximately 2-months.
 - 8.6.3. Membership (Schwob/LaForgia)
 - 8.6.3.1. Several changes coming for Long Beach
 - 8.6.3.1.1. Andrew Mitchell will be backing off as Secretary; Alex Michaud and Roman Wowk considering stepping in some leadership capacity in TC 2.6.
 - 8.6.3.1.2. Mike Schwob is rolling off in Long Beach with respect to the web page.
 - 8.6.3.1.3. Currently have ten (10) voting members. This will be Ken Roy's last meeting; Jack Wang is rolling off.
 - 8.6.4. Liaisons (Miller-Klein)
 - 8.6.4.1. ASHRAE TC 2.1 Physiology and Human Environment (K. Roy)
 - 8.6.4.1.1. Meeting is tomorrow, two (2) action items to discuss and get vote on RTAR 1707.
 - 8.6.4.1.2. Need to get a vote on co-sponsoring speech privacy.
 - 8.6.4.2. ASHRAE TC 2.7 Seismic and Wind Resistant Design (Peterman)
 - 8.6.4.2.1. Meeting tomorrow; SPC 171 ongoing.
 - 8.6.4.3. ASHRAE TC 5.1 Fan Design and Application (Osborn)
 - 8.6.4.3.1. Met this morning; efficiency for fan systems; sound and airflow performance; work statement performance and efficiency of pressure valve.
 - 8.6.4.4. ASHRAE TC 5.2 Duct Design (Hassler)
 - 8.6.4.4.1. Discussion on designated lecturers in the committee.
 - 8.6.4.4.2. Flexible duct is a hot topic of discussion in the group.
 - 8.6.4.4.3. Duct Design Guide
 - 8.6.4.4.4. Duct fitting database
 - 8.6.4.4.4.1. The duct fitting database is getting closer to completion; no date was given.
 - 8.6.4.5. ASHRAE TC 5.3 Room Air Distribution (Zimmerman)
 - 8.6.4.5.1. Main meeting tomorrow; not a lot going on with acoustics. Ongoing work with chilled beams and room fan coil unit energy efficiency.
 - 8.6.4.5.2. RTAR that Randy is trying to write; research to develop standards that would mirror of AHRI 880/885 but for underfloor air distribution systems. Feedback was that there was too much content initially; work is being done to reduce the scope of the RTAR.

8.6.4.5.3. AHRI 880/885 Air Terminals

- 8.6.4.5.3.1. Finishing update to 880; updated to incorporate AHSRAE 130 (certification points for exhaust boxes). 885 (not changes in a long time; TC on sound at AHRI started talking about things to look at, with ideas including (1) estimate NC level of diffusers based on 10 dB room effect and (2) radiated sound on terminal units that has 3 sets of attenuation (small, medium, large); dislike the idea that it's not a linear scale (step function in data set).

8.6.4.5.4. AHRI 1240 Performance Rating of Chilled Beams

- 8.6.4.5.4.1. Rating points for certification of chilled beam data; going to affect when ASHRAE 200 is corrected. Should soon see manufacturers requesting to be in certified data program for chilled beams.

8.6.4.6. ASA (L. Wang)

- 8.6.4.6.1. Meeting in Boston at the same time as the summer ASHRAE meeting.

8.6.4.7. VISCMA (Peterman)

- 8.6.4.7.1. Trying to conduct activities to increase visibility of brand; offering webinars (May); activity with LinkedIn (2-4 times per month); information out to industry via monthly bulletins; white papers have been put up on website, more coming; reaffirmed officers for upcoming year (8 full members).

8.6.4.8. Others: CTI (Miller-Klein), INCE (Lilly), NCAC (Bridger), CIBSE (Swan), EGSA (Simmons), etc...

- 8.6.4.8.1. CTI; thermal test agency that buys microphones can be a sound test agency. Miller-Klein became sound test agency for cooling towers, but was later removed (attempted to but removed license as a consultant). Only two (2) groups out of TN that conduct testing.

8.6.4.8.2. INCE is meeting in June in MI.

8.6.4.8.3. NCAC - Kenric Van Wyk has recently passed away.

8.6.4.8.4. EGSA - recommended practice of silencer ratings for generators is available online. Hospital grade (graded from A to F that represents levels of decibel reduction in lieu of hospital grade). There is not currently a test method for this product type.

8.6.4.8.5. Other: IAQ global alliance meeting tomorrow afternoon. This is the next "spin" on green buildings. People of ASHRAE have gotten together to form this alliance with others. Intent is to take the next step beyond green buildings (efficiency, sustainability) and is international in character.

8.6.4.8.6. Passive House (another European standard).

9. New business/Old business [5 minutes]

10. Next meeting date and location – Long Beach CA – June 24th–28th 2017

11. Adjournment

Attendees:

Same as Publications meeting that preceded it.

Highlights of Research Chair's meeting:

- Our research liaison is Pawel Wargocki (RL2@ashrae.net). Our Research Liaison (RL), should review all RTARs and WSs before submittal to RAC. Please copy Greg Meeuwsen, TC Research Chair (gmeeuwsen@trane.com) on all correspondence with the Research Liaison.
- All RTARs and WSs should have a clearly defined *Stage Funding* and *Project Milestones*. At the end of each phase there should be well defined deliverables and payments (based on % of total project cost), so that the PMS can assess the feasibility of the next phase and contractor's ability to complete the remainder of the project.
- Co-sponsoring TC's need to participate in the RTAR and WS preparation.
- For RTARs and WSs that are conditionally accepted, provide a cover letter addressing each comment.
- RTAR and WS due dates for submission to RAC are May 15, August 15, and December 15.

Ongoing Research Projects:

RP-1408 The effect of lining length on the insertion loss of acoustical duct liner. Jerry Lilly PMS chair. Dr. Doug Reynolds, UNLV, principle investigator. The objective of this research is to determine how the sound attenuation of lined ducts depends on duct length. The second draft of the report was received and discussed by the PMS, many comments need to be addressed. Expect to receive third draft of report by end of March. TC recommended a no-cost extension to July 1, 2017. Remaining deliverable is a Technical Paper.

RP-1529 Full frequency numerical modeling of sound transmission in and radiation from lined ducts –The project is complete and a final report is on the web site. Follow on work is needed to fill in gaps in the handbook. This can be done by submitting a WS under the same RP number. On hold until results of RP1408 are drafted for handbook.

Work Statements/RTARs:

RTAR-1754 - Developing the standard test method for dynamic characteristics of vibration isolators. RTAR is approved by RAC. WS was updated by Curt Eichelberger, needs perhaps some further update. Greg Meeuwsen will take over as lead for this project.

WS-1707 Annoyance thresholds of tones in noise as related to building services equipment. RAC returned the most recent (draft 7) WS with comments. Jason Swan has agreed to champion this project moving forward. The WS must be submitted by May 15, or topic will be dropped by RAC. This will require a TC vote by 2.6 and co-sponsor 2.1. Jason has goal to submit to RAC liaison for initial comment by March 15.

Speech privacy in high performance buildings – Ken Roy prepared a RTAR and reviewed with members at the Research Subcommittee at the June 2015 meeting. Erik Miller-Klein will be taking over this effort, and will revise RTAR for review by committee at summer meeting.

Inlet and Outlet System Effects on Multiple Plenum Fans in a Parallel Arrangement for Air and Sound Performance. --TC 5.1 is preparing an RTAR, and Kim Osborn volunteered to be our liaison with TC 5.1. TC voted to approve at Main committee meeting vote 9-0-0.

Topics discussed and prioritized for future research:

The top topics discussed during the research subcommittee meetings are listed below in order of priority.

1. Characterizing and rating the vibration force or energy of HVACR equipment. (Meeuwsen)

2. Characterizing by measurement or modeling the mechanical impedance of equipment support structures, roofs floors, etc.

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ASHRAE TC 2.6 Programs Subcommittee Meeting Agenda

Meeting Date: January 29, 2017

Programs Subcommittee Meeting Overview:

- Plan TC 2.6 program submissions for next two meetings
 - Las Vegas 2017 (January 28 – February 1, 2017)
 - Long Beach, CA 2017 (June 24 – 28, 2017)
 - Chicago 2018 (January 20 – 24, 2018)
- Discuss tentative TC 2.6 program ideas for future meetings
 - Houston 2018 (June 23 – 27, 2018)
 - Atlanta 2019 (January 12 – 16, 2019)

Definitions:

- Technical Papers
 - Submitted directly by author
 - More involved papers usually detailing research or similar activities
 - Maximum of 30 pages
 - Rigorous double-blind review process; subject to commercialism review
 - Longer timeline for development and approval
 - Published in *Transactions*
 - Due Completed 1 month after conference for review and presentation, for conference 1 year from current conference.
 - Example: March 1, 2017 for January 2018 Conference
- Conference Papers
 - Submitted directly by author
 - Less rigorous than technical papers
 - May highlight case studies or ongoing research
 - Maximum of 8 pages
 - Single blind review process; subject to commercialism review
 - Shorter timeline for development and approval
 - Abstract Due 1 month after conference, approval/rejection within 1 month, full paper due in 6 months, for conference 1 year from current conference.
- Seminars/Workshops/Forums
 - Session chairs and speakers selected by TCs
 - Program submitted by session chair
 - Submissions must include selected speakers, bios, abstract, learning objectives, Q&A
 - Speakers must submit presentations 1 month prior to meeting for commercialism review
 - Seminars
 - 60 minutes: 1 – 2 presentations
 - 90 minutes: 3 – 4 presentations
 - Workshops (new in Summer 2014)
 - One chair and two presenters (maximum)

- 60-minute length only: 30 minutes for presentations + 30 minutes for discussion
- Forums
 - One moderator
 - 60-minute length only: no presentations

Upcoming Conference Program Tracks:

Long Beach 2017 (June 24 – 28, 2017)

Deadlines:

August 29, 2016 – Conference Paper Abstracts Due

August 29, 2016 – Technical Papers Due

December 9, 2016 – Conference Papers Due

February 6, 2017 – Seminar, Forum, and Workshop Proposals Due

Track 1 Fundamentals and Applications

Track 2 HVAC&R Systems and Equipment

Track 3 Refrigeration

Track 4 Building Life Safety Systems

Track 5 Controls: Smart Building Systems and the Security Concerns as Technology Emerges

Track 6 Commissioning: Optimizing New and Existing Buildings and their Operation

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

Track 8 Residential Buildings: Standards Guidelines and Codes

Track 9 Research Summit

Chicago 2018 (January 20 – 24, 2018)

Deadlines:

March 1, 2017 – Conference Paper Abstracts/Technical Papers Due

July 7, 2017 – Conference Papers Due

August 1, 2017 – Seminar, Forum, and Workshop Proposals Due

Future Programs

Track 1 Fundamentals and Applications

- Sound Traps/Silencers – When are they necessary; E477 round robin

Track 2 HVAC&R Systems and Equipment

- Academic & Research Labs: Air Valve Noise, Fume Hoods

Track 3 Standards, Guidelines, and Codes

- Why Acoustics with Acoustic Quality Experience

Track 4 Earth, Wind & Fire

Track 5 Transportation IAQ and Air Conditioning

- Jack Wang, Thermo-King and ASME colleagues?

Track 6 Tall Buildings

Track 7 Modeling Throughout the Building Life Cycle
 Track 8 Heat Exchange Equipment
 Track 9 Refrigerant Mini Track @ Expo

Program Topics: Long Beach 2017 (June 24 – 28, 2017)

February 10, 2017 – Seminar, Forum, and Workshop Proposals Due

Conference	Subject	Type	Status	Session Organizer
Long Beach 2017	Track 1 Fundamentals and Applications Track 2 HVAC&R Systems and Equipment Track 3 Refrigeration Track 4 Building Life Safety Systems Track 5 Controls: Smart Building Systems and the Security Concerns as Technology Emerges Track 6 Commissioning: Optimizing New and Existing Buildings and their Operation Track 7 Net Zero Energy Buildings: The International Race to 2030 Track 8 Residential Buildings: Standards Guidelines and Codes Track 9 Research Summit			
Long Beach 2017	Track 8 Residential Buildings: Standards Guidelines and Codes <i>Where Codes, Standards & Guidelines Fall Short: Tones</i> Review of Codes/Standards/Guidelines with respect to Tones (Interior & Exterior) Building Support Systems – Tones (Rooftop Equipment, Transformers, VRFs, etc.) ISO 532B – Prominence Tones		Erik M-K Roman Wowk	Roman Wowk
Long Beach 2017	Track 6 Commissioning: Optimizing New and Existing Buildings and their Operation ASHRAE PMP Best Practices 189.1			
Long Beach 2017	Track 8 Residential Buildings: Standards Guidelines and Codes <i>Latest Standards for Multi-Family Acoustics</i> Multi-family: IBC, ICC G2-Guidelines, HUD 189.1 ISO Noise Rating Buildings (19488)	Seminars	Sammi Rawlings Erik Miller-Klein	Erik M-K

			Jason Swan	
Chicago 2018	Technical Paper Session (no specific track) (August 29 th , 2016 Submission deadline)	Technical Paper Session	After RP approved	Doug Reynolds
Chicago 2018	Track 3 Standards, Guidelines, and Codes ASHRAE 189.1 – Acoustics ASHRAE 189.1 Acoustics User's Manual Related Codes, Standards & Guidelines	Seminar	Erik Miller-Klein Michael Schmeida Joe Bridger	Erik Miller-Klein

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Hot Topic – Subcommittee Presentation

Invite outside special topic speaker to meetings, listed in the ASHRAE schedule and available to both TC 2.6 and larger organization.

- Speakers can be video-conferenced for this special session

Future

- Elevator Noise Control (Lilly)
- Electrical Noise: transformers, electrical motors (Papadimos)
 - Part of Tonal, Track 8 - Long Beach
- Sound attenuators and acoustical louvers (how they actually perform vs. how they are designed to perform) (Papadimos)
- Discussion of Classroom Acoustics Standard ANSI S12.60 that has been adopted by the ICC as code (Bridger)
- Predictions vs. Laboratory vs. Field Testing (Papadimos & Marks)

Other Notes

- Session organizer should focus on content of abstracts (especially the abstract for the session) to make sure abstracts are good. Track chairs look at abstracts to determine if session will be accepted or not.
- Session organizers should compile all information for submitted sessions in word document, so that the sessions can be easily resubmitted for future conferences if session is rejected.
- It is now mandatory for speakers to use an ASHRAE-developed template for all presentations at meetings (choices of templates are available on ASHRAE website).

Attendees:

	Name	E-mail
1	Roman Wowk	roman@papadimosgroup.com
2	Chris Papadimos	chris@papadimosgroup.com
3	Erik Miller-Klein	erik@a3acoustics.com
4	Greg Meeuwsen	gmeeuwsen@trane.com
5	Jerry Lilly	jerry@jglacoustics.com
6	Rich Peppin	peppinr@asme.org
7	Ken Roy	kproy@armstrongceilings.com
8	Kristen Graham	kgraham@kineticsnoise.com
9	Robert Hassler	rhassler@kineticsnoise.com
10	Karina Saenz Acosta	karinaa@aaon.com
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15	Matthew Hooti	mhooti@isotechindustries.com
16	Jason Swan	jasons@sandybrown.com
17	Steve Wise	stevewise@att.net
18	Kenny Hightower	khightower@petraseismicdesign.com
19	Lawrence Copley	lgcopley@verizon.net
20	Patrick Marks	Paatrick.c.marks@jci.com
21	Mark Long	Mark.long@systemair.net

Reference Information: Track Descriptions

Long Beach 2017 (June 24 – 28, 2017)

Deadlines:

August 29, 2016 – Conference Paper Abstracts Due

August 29, 2016 – Technical Papers Due

December 9, 2016 – Conference Papers Due

February 6, 2017 – Seminar, Forum, and Workshop Proposals Due

- **Track 1: Fundamentals and Applications**

Track Chair: Frank Schambach

Email: frankschambach@mindspring.com

It's back to the basics! This track provides the foundation for design and construction of HVAC&R components and their application. This track seeks papers and programs of varying levels to provide discussion on theories, models, designs and shared experiences. Topics may range from fan laws and psychometrics to room air distribution and heat transfer and much more.

- **Track 2: HVAC&R Systems and Equipment**

Track Chair: Jennifer E. Leach

Email: pennst8jen@yahoo.com

What system and equipment are best for my building? Selection of equipment and design of systems is critical for effective HVAC&R operation and usually has more than one right answer. This track will provide engineers, designers, contractors, owners and building operators the tools to properly design, select and operate traditional, non-traditional and hybrid equipment and systems. The papers and programs within this track may range from basic concept to the technical analysis of system performance.

- **Track 3: Refrigeration**

Track Chair: Vikrant Aute

Email: vikrant@umd.edu

The refrigeration cycle is a key component to our daily needs, as it is used for thermal comfort, food storage, creating ice and medicinal needs. There have been numerous improvements and changes to refrigeration systems and refrigerants to accommodate the increased system efficiency. This track seeks papers and programs that address the wide range of applications of refrigerants and their improvements, including variable refrigerant flow applications, refrigerant management and food storage.

- **Track 4: Building Life Safety Systems**

Track Chair: Robert Alan Neely

Email: alan_neely@pghcorning.com

Building life safety systems are critical in commercial facilities to protect building occupants from fires and power outages. This track focuses on building egress, fire protection systems, fire alarms, emergency lighting, fire and smoke barriers, and special hazard protection and describes key factors to consider when designing these life safety systems. Papers and programs are sought to evaluate design strategies for the life safety systems noted above along with building specific life safety systems, such as gas detection systems, kitchen ventilation and smoke evacuation systems, etc.

- **Track 5: Controls: Smart Building Systems and the Security Concerns as Technology Emerges**

Track Chair: Melanie Derby

Email: derbym@ksu.edu

This track will explore smart building systems and how they can be incorporated into commercial facilities to help reduce energy consumption and improve occupant comfort. As these technologies advance and buildings become "smarter," the question is asked ... "Is my building in threat of a cyber attack?" As owners and designers incorporate more controls system with web and cloud access into buildings, there is a concern that this allows more opportunities for hackers to gain access into sensitive and confidential databases. The programs within this track will explore measures to keep this information safe, while maintaining the flexibility of remote control/access of building systems.

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

Track Chair: Dennis Alejandro

Email: denzjac@yahoo.com

High efficiency building systems come at a cost, and after the owner's initial investment it is important to verify that the system components are operating as the designer intended.

Secondly, the systems need

to be operated properly to reach and maintain the system efficiency levels. This track seeks papers and programs providing lessons learned and recommendations for successful commissioning projects. This track also seeks case studies of existing buildings with a retro-commissioning plan to reduce energy consumption and evaluate the payback of these modifications.

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

Track Chair: Jason DeGraw

Email: jason.degraw@nrel.gov

Title 24 and Architecture 2030 have ambitious goals for all commercial buildings in California to be Net Zero Energy (NZE) by the year 2030. This track will assist the design team and owners to evaluate various systems (including HVAC, building envelope, lighting, domestic water and renewable energy system), design strategies, construction measures and building operation to achieve NZE. The programs within the track will also explore the advancing code and regulations that countries around the world are implementing to reduce building energy consumption.

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

Track Chair: Kimberly Pierson

Email: kdpwildcat@gmail.com

ASHRAE is known for its standards and design guidelines and their evolution to improving the built environment and its systems. This track will inform designers, contractors and owners of the current requirements and upcoming changes to ASHRAE's low-rise residential guidelines: Standard 90.2, Standard 62.2 and Guideline 24. This track also seeks papers and programs for cutting-edge residential systems and the incorporation of ASHRAE standards in the design.

- **Track 9: Research Summit**

Track Chair: Ann Peratt

Email: ann.peratt@gmail.com

The fifth annual Research Summit brings together distinguished researchers to present the latest research results. Papers are requested on the following topics: 1) building science research that address the performance of buildings systems and occupant usage and 2) renewable energy research and its impact as we move towards net zero energy buildings.

Conference Program Chair: Ann Peratt

Email: ann.peratt@gmail.com

Chicago 2018 (January 20 – 24, 2018)

Deadlines:

March 1, 2017 – Conference Paper Abstracts/Technical Papers Due

July 7, 2017 – Conference Papers Due

August 1, 2017 – Seminar, Forum, and Workshop Proposals Due

- **Track 1: Systems and Equipment**

Track Chair: Carrie Anne Crawford

Email: carriecrawford@eeace.com

Selection of equipment and systems is paramount to HVAC&R design. Papers and programs in this track will assist designers, engineers, and operators in the design, selection, and operation of HVAC&R systems and equipment.

- **Track 2: Fundamentals and Applications**

Track Chair: Kevin Marple

Email: kmarple@benzco.com

Fundamentals are the foundation for understanding applications in engineering. Key components of ASHRAE fundamentals include thermodynamics, psychrometrics, fluid and mass flow, IAQ, and building envelope. This track provides opportunities for papers and presentations of varying levels across a large topic base. Concepts, design elements and shared experiences for theoretical and applied concepts of HVAC&R design are included.

- **Track 3: Standards, Guidelines and Codes**

Track Chair: Corey Metzger

Email: corey.metzger@resourcece.com

ASHRAE is known for its standards and design guidelines – and they are constantly evolving with the intent on improving the built environment and its systems. Designers, Contractors, Architects and Owners must be able to keep up with the continuing changes in the current cycle but to also be prepared for the future changes. In addition, there is a large interaction of ASHRAE with the code authorities and government to incorporate these standards and guidelines. The series of sessions in this track highlight the changes to the standards and guidelines, their projected path and optimum design techniques to meet or exceed the standards.

- **Track 4: Earth, Wind & Fire**

Track Chair: Ashish Rakheja

Email: ashish.rakheja@aeonconsultants.in

Designing for natural elements and other possible disasters often requires specific elements of building design and construction. From materials to stabilizing elements and simulations to specifications, these options must be incorporated. This track will deliver on modern strategies to address all of these conditions. Be prepared to be blown away by industry practices to prevent disastrous results.

- **Track 5: Transportation IAQ and Air Conditioning**

Track Chair: Dimitris Charalambopoulos

Email: dimitris@ashrae.gr

Often considered boutique engineering, both enclosed vehicular facilities and transportation design, construction, operation, and maintenance needs to be elevated to equal status with other HVAC applications. These systems require the same design approach as other system designed but usually have special technical requirements that mandate close velocity capture/control, air quality control, etc. that can be overlooked but the more traditional building system design engineer. This track will seek case studies and trouble-shooting projects highlighting the opportunities and pitfalls associated with these unique applications.

- **Track 6: Tall Buildings**

Track Chair: Leticia Neves

Email: leneves@gmail.com

Chicago is home to one of the tallest buildings in the world. One that stood the tallest in the world for nearly 25 years. However, today, more and more tall buildings are being designed and constructed. This track will draw upon “larger than life” case studies, as well as large building HVAC systems that can be classified as “innovative and/or 21st century” that highlight the opportunities presented and achieved by the designer, builder, and operator for facility HVAC systems throughout the world.

- **Track 7: Modeling Throughout the Building Life Cycle**

Track Chair: Joseph Firrantello

Email: j.firrantello@gmail.com

Modeling was originally concerned primarily with building and system design specifications. The demands of energy efficient operation brought about the need for modeling of part-load operation for a variety of off-design conditions. The explosion of computational capacity and data collection capability is rapidly expanding the scope, complexity and practical applications of modeling both during design, but even more so for fault detection, diagnostics and operational optimization. Thirty years ago, people were dreaming of doing some of the things that Building Information Modeling is now bringing to reality. Presentations and papers are solicited related to all aspects of building modeling, with a particular interest in successful applications that have extended modeling into operational phases of the building life cycle.

- **Track 8: Heat Exchange Equipment**

Track Chair: Vikrant Aute

Email: vikrant@umd.edu

Given the critical importance of energy efficiencies and reliability of HVAC systems, new heat and mass transfer HVAC & R equipment and advanced systems have been developed. Bringing non-traditional technologies to the actual field is not trivial task and how to design the equipment and characterize the performance of new HVAC &R technologies under real field type conditions are still open questions. The papers and programs in this track will inform designers, engineers, building energy simulation modelers, and energy consultants and practitioners in the use of non-traditional heat exchange equipment and advanced HVAC &R systems under real field type conditions. The track will focus on fundamentals and applied aspects, on current challenges and recent advancements for managing frost growth, water condensate, fouling, corrosion, and mitigation of mold growth and bacteria that are often encountered in heat exchange equipment when working under real field type conditions.

- **Track 9: Refrigerant Mini Track @ Expo***

Track Chair: Gary C. Debes

Email: gcdebes@verizon.net

*Section will determine topics, speakers, session types, etc.

Conference Program Chair: Michael Collarin

Email: Michael.Collarin@parsons.com

For information on the technical program, special events, special sessions and general conference inquiries; Tiffany D. Cox, Assistant Manager of Conference Programs, Email: tcx@ashrae.org

DRAFT

To: Dan LaForgia
From: Steve Wise
Date: Jan 31, 2017
Subject: TC2.6 Publications Subcommittee Minutes – Las Vegas, Jan. 2017

Attendees: Wongyu Choi Mike Holscher Andrew Mitchell (*voting members*) Lawrence Copley Joe Horesco Kim Osborne
Michael Schwob
Ben Shafer
Jeremy Stockmans
Terry Tyson
Don Warick
Roman Wowk

Dan LaForgia	Nate Deibler	Johni Iacobellis	Chee S. Ow
Erik Miller-Klein	Curt Eichelberger	Reggie Keith	Chris Papadimos
Ken Roy	Mark Fly	Ronald Lent	Rich Peppin
Jason Swan	Matthew Hooti	Jerry Lilly	Ken Roy
Trevor Caldwell	Robert Hassler	Pat Marks	Karina Saenz Acosta
Deborah Callaway	Kenny Hightower	Greg Meeuwsen	Michael Schmeida

FUNDAMENTALS HANDBOOK, 2017 REVISION

Done. You'll see it in June.

WEBSITE

Website is in good shape. Note the ASHRAE location: <https://tc0206.ashraetcs.org/>. Also, today Mike Schwob caught an error that ASHRAE has corrected regarding our scope:

“TC 2.6 is concerned with the fundamental scientific and engineering principles of sound and vibration, particularly as applied to the design and performance of the built environment.”

APPLICATIONS HANDBOOK

There is a new update procedure for the print version – All TC members have access on-line to make edits.

We will see how this plays out. This year will begin activity for rev2019 – **Steve Wise will provide update in Long Beach.**

Urgent errors-to-fix:

A) Vibration Control for Screw Chillers.....will be updated in print and on-line versions by: **Matthew Hooti, Jerry Lilly, Chris Papadimos, Pat Marks, and Karina Saenz Acosta.** **B) OUTDOOR CRITERIA** – Steve Wise will arrange a telecon in early March with: **Roman Wowk, Jason Swan, Jerry Lilly, Reggie Keith, Erik Miller-Klein** to assess if/what near term update to the Handbook is necessary to appease some readers who want more ASHRAE guidance – ***in the absence of local ordinances.***

THE ON-LINE VERSION REFORMAT

Apart from the above 2019 PRINT rev, we kicked around “Long Term Planning” concepts as a way to focus our vision on a target for timeframe and format, and content... what ASHRAE wants/needs is TBD and evolving.

ACTION BY CONSENSUS:

1. Who is our **audience** for on-line chapter? (**#1= A-Es / #1a= Noise Consultants / #2= Mftrs / #3= Owners**)
2. What is the best **format** for links, etc. (**Other chapters to date are not very sexy.....We will explore enhancements**)
3. What is our **time target** (**2019 per print rev? farther out? NOT SURE**)
4. What is best **screen** format? (**iPhone? → TABLET for now**)
5. Are we **mistakenly** trying to answer questions in the Handbook that do not have supportable product data/research, and can only be resolved by knowledgeable experts, case-by-case? ***And if experts are needed, isn't then the purpose of the Handbook just to establish general goals rather than detailed solutions? (Can only go so far.....there will be special cases.)***

OTHER TO-DO ITEMS:

UPDATE DUCT ATTENUATION SECTION(Incorporate results from RP 1408 /1529) Joe

Bridger, Jerry Lilly, Jason Swan, Andrew Mitchell

CONFIRM THAT ALL ALGORITHM EQUATIONS ARE INCLUDED Steve

Wise, Jason Swan, Ghee S. Ow

GET "APPL of MFTR DATA" BOOKLET INFO INTO HANDBOOK

Steve Wise, Jerry Lilly, Erik Miller-Klein, Roman Wowk, Pat Marks

RE-FORMAT VIBRATION SECTION

Was: Matthew Hooti, Eric Sturm, Erik Miller-Klein, Karina Saenz Acosta, Don Warick, Robert Simmons, Pat Marks

Add: Michael Schmeida, Chris Papadimos, Mike Schwob, Trevor Caldwell, Nate Deibler, Karl Peterman, Reggie Keith **And**
from ASHRAE: Heather Kennedy, Chee S. Ow, Chris Ahne

DRAFT

Vibration Isolation Sub-Committee:

- A great case study on Transformer vibration isolation was presented by Roman Wowk from Papadimos Group. Reggie Keith and Matthew Hooti volunteered to prepare more case study for the next meeting on this topic.
- New Format on Table 47 of Chapter 48, attached, was presented by Steve Wise. This would be for the online version where the user can select equipment and floor span to get the proper isolation solutions. Chris Papadimos suggested new equipment and new approaches based on the case studies available should be incorporated in to this chapter. It was decided that for the first phase the format must be completed and for the next phase, new approaches should be introduced and added to the online version. The following people volunteered to work on this new format:
 - 1) Eric Miller-Kline
 - 2) Matthew Hooti
 - 3) Reggie Keith
 - 4) Trevor Caldwell
 - 5) Karina Saenz-Acosta

Volunteers will meet on a regular basis to complete the project before the Next meeting.

ASHRAE RP-1408
The Effect of Lining Length on the Insertion Loss of Acoustical
Duct Liner in Sheet Metal Ductwork
PMS Meeting Minutes
Las Vegas, NV
10:00 AM to 11:00 AM, January 29, 2016

Principal Investigator: Doug Reynolds, UNLV

PMS Members Present: Jerry Lilly (chair), Kim Osborne, Rich Peppin, Curt Eichelberger, Reggie Keith (added to the PMS today to replace John Gierzak)

PMS Members Absent: Francis Babineau, Mark Schaffer, John Gierzak, Rob Lilkendey

1. Brief Project History

Contract awarded in January 2009
Change order to add vibration measurements and breakout February 2010
Actual testing of ASHRAE round ducts at UNLV began in July 2012
PMS visited the lab to observed test set-up October 2012
Rectangular ducts fabricated and tested at Price Industries 2014
Completion of round duct testing at UNLV in September 2014
Data analysis conducted in 2015
First draft report received 1/22/16
Second draft report received 1/1/17

2. Status of Project

UNLV was originally contracted to test all duct sizes and shapes
Price conducted tests on all of the rectangular ducts, including elbows and branches
UNLV conducted tests on all of the round ducts, plus 30% of the rectangular ducts
UNLV did not test any elbows or branch ducts
UNLV did not conduct any vibration or breakout measurements
No additional testing will be conducted, and data analysis is complete
P.I. has agreed to respond to PMS comments and update draft report prior to 3/1/17

3. Progress & Financial Reports

Last report submitted to ASHRAE was for 7/1/15 through 3/31/16

4. No-cost Extension

A no-cost extension to July 31, 2017 is recommended by the PMS.