

**ASHRAE**

1791 Tullie Circle, N.E./Atlanta, GA 30329  
404-636-8400

**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	January 30, 2015
TC/TG/MTG/TRG TITLE	Sound and Vibration		
DATE OF MEETING	January 26, 2015	LOCATION	Chicago, IL

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
<b>Voting Members:</b> Bridger, Joseph Dunlap, John LaForgia, Dan Lilly, Jerry Meredith, Dustin Miller-Klein, Erik Murello, Matthew Papadimos, Chris Prime, Raj Reynolds, Douglas Ronsse, Lauren Roy, Kenneth Swan, Jason Tyson, Terence Zimmerman, Randal  <b>Corresponding Members:</b> Abbate, Daniel Boldt, Jeffrey Bushnell, Peter Chinoda, Zvirimumwoyo Cuff, Nicole Eichelberger, Curt Ganesh, Radha Hassler, Robert Horesco, Joseph Kowald, Will Marks, Patrick Meisel, Paul Michaud, Alexander Miller, Gregory		<b>Voting Members:</b> Schwob, Michael Osborn, Kim  <b>Non-Quorum Members:</b> Stead, Matthew Tripathi, Vijay  <b>Corresponding Members:</b> Alkhalil, Rami Babich, Jeffrey Babineau, Francis Bastasch, Mark Berardi, Umberto Broner, Norman Busch, Todd Carroll, David Clemente, Victor Deveci, Martin Eaton, Erroll Eligator, Ronald Fly, Mark Froehlich, Michael Gaghan, Kevin George, Jason Gierzak, John Goodfriend, Lewis Guenther, Brian Guney, Ali Kemal Hallstrom, Arthur Herfat, Ali Keating, Michael		<b>Visitors:</b> Cincotti, Franco Copley, Lawrence Deibler, Nate Hightower, Kenny Iacobellis, John Mouratidis, Emanuel Murphy, John Peters, Curtis Rosenberg, Eric Wang, John Feuser, Michael Waters, Angela Hoffman, Erica Stockmans, Jeremy Long, Mark Nelson, Jennifer

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MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Mitchell, Andrew Peterman, Karl Resetar, Michael Simmons, Robert Wang, Jack Wang, Lily Wang, Zhiping Wise, Steve  <b>Provisional Corresponding:</b> Desai, Ashish Sardar, Asad		Keith, Reginald Khati, Manoj Kline, Jim Kloostra, Marvin Lai, Kevin Lau, Eddie Lilkendey, Robert Mattocks, Charles Meeuwsen, Greg Muehleisen, Ralph Nepomuceno, Jose Oliver, Patrick Pappas, John Peppin, Richard Pooler, James Reynolds, Brian Rockwood, William Ryherd, Erica Sachwald, Benjamin Schaffer, Mark Shook, Ken Simcoe, Tim Sofra, John Spencer, Michael Stewart, William Sylvestre-Williams, Nicholas Weinstein, Jonathan Wowk, Roman Zybura, Jack		

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**DISTRIBUTION**

<b>All Members of TC/TG/MTG/TRG plus the following:</b>	
TAC Section Head:	Thomas Sobieski
TAC Chair:	Eric Adams
All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters:	Sheila Hayter Darin Nutter Cyrus Nasser Harvey Sachs Michael Vaughn Chris Fudge
Manager Of Standards:	Stephanie Reiniche
Manager Of Research & Technical Services:	Mike Vaughn

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<b>Voting Members</b>				
<b>Index</b>	<b>Name</b>	<b>Affiliation</b>	<b>E-Mail</b>	<b>Present?</b>
1	Bridger, Joseph	Stewart Acoustical Consultants	joe@sacnc.com	Y
2	Dunlap, John	Dunlap & Partners Engineers	jdunlap@dunlappartners.com	Y
3	LaForgia, Dan	Vibro-Acoustics	dlaforgia@vibro-acoustics.com	Y
4	Lilly, Jerry	JGL Acoustics	jerry@jglacoustics.com	Y
5	Meredith, Dustin	Trane	dmeredith@trane.com	Y
6	Miller-Klein, Erik	SSA Acoustics	erik@ssaacoustics.com	Y
7	Murello, Matthew	Lewis S Goodfriend & Associates	mmurello@lsga.com	Y
8	Osborn, Kim	CES Group / Governair	kosborn@governair.com	
9	Papadimos, Chris	Papadimos Group	cpapadimos@papadimosgroup.com	Y
10	Prime, Raj	Mason Industries	rprime@mason-ind.com	Y
11	Reynolds, Douglas	University of Nevada Las Vegas	douglas.reynolds43@gmail.com	Y
12	Ronsse, Lauren	Columbia College Chicago	ronsse.lauren@gmail.com	Y
13	Roy, Kenneth	Armstrong World Industries	kproy@armstrong.com	Y
14	Schwob, Michael	JBA Consulting Engineers	michael.schwob@jbace.com	
15	Swan, Jason	Sandy Brown Associates	jasons@sandybrown.com	Y
16	Tyson, Terence	Acentech	tysont@asme.org	Y
17	Zimmerman, Randal	Titus	rzimmerman@titus-hvac.com	Y
18				
				15

Corresponding Members

<b>Name</b>	<b>Affiliation</b>	<b>E-Mail</b>	<b>Present?</b>
Abbate, Daniel	AHRI	dabbate@ahrinet.org	Y
Boldt, Jeffrey	KJWW Engineering	boldtjg@kjww.com	Y
Bushnell, Peter	UTC Building & Industrial Systems	peter.bushnell@carrier.utc.com	Y
Chinoda, Zvirimumwoyo	Hartzell Air Movement	pchinoda@hartzell.com	Y
Cuff, Nicole	Acentech	ncuff@acentech.com	Y
Eichelberger, Curt	Johnson Controls	curtis.eichelberger@jci.com	Y
Ganesh, Radha	Twin City Fan Companies	rganesh@tcf.com	Y
Hassler, Robert	Kinetics Noise Control	rhassler@kineticsnoise.com	Y
Horesco, Joseph	Acentech	jhoresco@acentech.com	Y
Kowald, Will	Lennox Industries	will.kowald@lennoxind.com	Y
Marks, Patrick	Johnson Controls	patrick.c.marks@jci.com	Y
Meisel, Paul	Kinetics Noise Control	pmeisel@kineticsnoise.com	Y
Michaud, Alexander	Price Industries	alexm@price-hvac.com	Y
Miller, Gregory	Threshold Acoustics	gmiller@thresholdacoustics.com	Y
Mitchell, Andrew	PCI Industries	amitchell@PCI-INDUSTRIES.com	Y
Peterman, Karl	Vibro-Acoustics	kpeterman@vibro-acoustics.com	Y
Resetar, Michael	Armacell	michael.j.resetar@armacell.com	Y
Simmons, Robert	Petra Seismic Design	rsimmons@petraseismicdesign.com	Y

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Wang, Jack	Trane	jjwang@trane.com	Y
Wang, Lily	University Of Nebraska	lwang4@unl.edu	Y
Wang, Zhiping	Morrison Products	zpwang@morrisonproducts.com	Y
Wise, Steve	Wise Associates	stevewise@att.net	Y

Provisional Corresponding Members

Name	Affiliation	E-Mail	Present?
Desai, Ashish	Metal Industries	adesai@metalindustriesinc.com	Y
Sardar, Asad	Carrier	asad.m.sardar@carrier.utc.com	Y

Guests

Name	Affiliation	E-Mail	Present?
Cincotti, Franco	Comefri USA	fcincotti@comefriusa.com	Y
Copley, Lawrence	Consultant	lgcopley@verizon.net	Y
Deibler, Nate	Mason Industries	ndeibler@mason-ind.com	Y
Hightower, Kenny	Petra Seismic Design	khightower@petraseismicdesign.com	Y
Iacobellis, John	Vibration Eliminator Co.	johniac@veco-nyc.com	Y
Mouratidis, Emanuel	VAW Systems	emouratidis@vawsystems.com	Y
Murphy, John	Jogram	jogram@bright.net	Y
Peters, Curtis	Nailor	cpeters@nailor.com	Y
Rosenberg, Eric	Grumman/Butkus Assoc.	erosenberg@grummanbutkus.com	Y
Wang, John	Carrier	john.wang@carrier.utc.com	Y
Feuser, Michael	TCF Clarage	mfeuser@clarage.com	Y
Waters, Angela	Kinetics Noise Control	awaters@kineticsnoise.com	Y
Hoffman, Erica	Columbia College Chicago	erica.hoffman60@gmail.com	Y
Stockmans, Jeremy	ChangeAir/System Air	jeremy.stockmans@systemair.net	Y
Long, Mark	ChangeAir/System Air	mark.long@systemair.net	Y
Nelson, Jennifer	Threshold Acoustics	jnelson@thresholdacoustics.com	Y

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## **ASHRAE TC 2.6 Sound and Vibration Control**

### **Main Committee Meeting Agenda**

**2:15-4:15 PM Monday, January 26<sup>th</sup>, 2015**

**Monroe Room – Palmer House Hilton 6<sup>th</sup> Floor – Chicago, IL**

**NOTE: All Task Group Chairs and Subcommittee Chairs are asked to submit written report to the Secretary (Erik Miller-Klein) before February 16<sup>th</sup>.**

- 1. Call to order** (Meredith) [3 minutes]
  - 1.1. Read scope of TC 2.6
  - 1.2. Read 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](http://www.ashrae.org/about-code-of-ethics))."
  - 1.3. Additions and/or modifications to the agenda
- 2. Introduction of those present** (Meredith) [5 minutes]
  - 2.1. Welcome new members and visitors
- 3. Confirmation of current voting members** (Schwob/LaForgia) [3 minutes]
- 4. Review and approval of the minutes** (Miller-Klein) [3 minutes]
  - 4.1. 1<sup>st</sup> John Dunlap, 2<sup>nd</sup> Jason Swan, (15 vote - Yes)
- 5. Secretary's report** (Miller-Klein) [3 minutes]
  - 5.1. February 16<sup>th</sup> due date for report including subcommittee meeting summaries
- 6. TC Chair's meeting report** (Meredith) [5 minutes]
  - 6.1. Chairs meeting summary:
    - 6.1.1. Joint efforts for TC (joint efforts referred to as MTG),
    - 6.1.2. 2.6 chapter of the year for Section 2,
    - 6.1.3. CEC next meeting in Atlanta 2015, Winter 2016 with Expo in Orlando,
    - 6.1.4. Presenter ratings below 3.5 score of lower will now include initial submission review,
    - 6.1.5. 102 total slots – 117 seminars submitted,
    - 6.1.6. Template to let local chapter know about TC and activities,
    - 6.1.7. ASHRAE Learning Institute idea submit to national
  - 6.2. Identify discipline for TC 2.6 and in your ASHRAE bio
- 7. Chair's announcements and correspondence** (Meredith) [3 minutes]
- 8. Subcommittee reports (written reports to be provided to Secretary)**
  - 8.1. **Research Subcommittee** (Eichelberger) [20 minutes]
    - 8.1.1. Research Chair's meeting report
      - 8.1.1.1. Liason: Harvey Sacks
      - 8.1.1.2. Phased approach requested with focus on deliverables and ability to cancel projects that are not fulfilling goals
    - 8.1.2. Ongoing research projects
      - 8.1.2.1. RP-1408 Attenuation of Lined Ducts with PI Reynolds/UNLV (Lilly)
        - 8.1.2.1.1. No cost extension to finish by January 31, 2016

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- 8.1.2.1.2. Matrix of test to identify tests to be completed, and may be omitted
- 8.1.2.1.3. PMS will make recommendation to RAC based on the voting on of this matrix
- 8.1.2.1.4. 1<sup>st</sup> Jerry Lilly, 2<sup>nd</sup> Terry Tyson, (13 yes, 1 abstain, 1 chair)
- 8.1.2.2. RP-1529 Numerical Modeling of Lined Ducts with PI Herrin/UK (Marks)
  - 8.1.2.2.1. No cost extension award to finish by January 31, 2016 – Voted by PMS Committee (unanimous)
  - 8.1.2.2.2. Draft to be completed by May 2015
  - 8.1.2.2.3. 1<sup>st</sup> John Dunlap, 2<sup>nd</sup> Jerry Lilly, (14 yes, 1 chair)
- 8.1.3. Work Statements/RTAR's/URP's
  - 8.1.3.1. RTAR-1707 Annoyance Thresholds of Tones in Noise (L. Wang)
    - 8.1.3.1.1. Work statement completed to be voted on within 60 days via letter ballot
  - 8.1.3.2. RTAR-1754 Developing the Standard Test Method for Dynamic Characteristics of Vibration Isolators (J. Wang)
    - 8.1.3.2.1. RAC conditionally approved the RTAR and Vibration Subcommittee moving forward with Work Statement
  - 8.1.3.3. RTAR-\*\*\* Speed privacy in High Performance Buildings (Roy)
    - 8.1.3.3.1. Forwarding draft to members of committee for subcommittee review in Atlanta 2015
  - 8.1.3.4. RTAR-\*\*\* Room effect (Bridger)
    - 8.1.3.4.1. 1<sup>st</sup> step – Literature review
  - 8.1.3.5. RTAR-\*\*\* Flow noise generation in ducts and fittings (G. Miller)
  - 8.1.3.6. RTAR-\*\*\* Plumbing Noise (Miller-Klein)
    - 8.1.3.6.1. Jerry Lilly & Chris Papadimos, NRCC and ISO 3822 Test Standard
  - 8.1.3.7. RTAR-\*\*\* Fluctuation Criteria
    - 8.1.3.7.1. Pending the research conclusions of RTAR-1707
- 8.1.4. Topics for future research
  - 8.1.4.1. Flex Duct
  - 8.1.4.2. History and research for Criteria
  - 8.1.4.3. Insertion Loss of Terminal Units
- 8.2. **Programs Subcommittee** (Ronsse) [15 minutes]
  - 8.2.1. Program Chair's meeting report
  - 8.2.2. Programs this meeting
    - 8.2.2.1. Submitted for Healthcare Design program with Roy
    - 8.2.2.2. Hot topics this meeting
      - 8.2.2.2.1. Jerry Lilly, Rooftop Packaged Condensing Units on Noise and Vibration in Lightweight Building Roof
      - 8.2.2.2.2. Jerry Lilly, Sound Measurement in Rooms ANSI S12.72
  - 8.2.3. Potential programs next meeting – Atlanta, June 2015
    - 8.2.3.1.1. DUE: February 9<sup>th</sup>, focus on abstracts and engage track shares
    - 8.2.3.2. Green Building Acoustic Performance Guidelines & Standards (L. Wang)
    - 8.2.3.3. Workshop on Vibration Isolation (Miller-Klein)

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- 8.2.3.3.1. Jerry Lilly, Rooftop Packaged Condensing Units on Noise and Vibration in Lightweight Building Roof
- 8.2.4. Potential programs 2016 Winter – Orlando
  - 8.2.4.1. The Great Debate: Passive & Active (Wise)
  - 8.2.4.2. Healthcare Acoustic Design (Miller-Klein)
  - 8.2.4.3. TC 2.7 & TC 2.6 coordinated with Design Build (8 Tracks about for Integration)
- 8.3. **Publications Subcommittee** (Wise) [10 minutes]
  - 8.3.1. Handbook chapters
    - 8.3.1.1. Handbook Applications 2015 (Wise)
      - 8.3.1.1.1. Online version coordination with J. Wang, R. Keith and Miller-Klein
    - 8.3.1.2. Handbook Fundamentals 2017 (Weinstein/Wise)
  - 8.3.2. Other publications
    - 8.3.2.1. Algorithms for HVAC Acoustics
      - 8.3.2.1.1. 25 years ago CD ROM and Book out of print
      - 8.3.2.1.2. Greg Miller with review historic document to provide initial edits
      - 8.3.2.1.3. Kim Osborn noted that this needed updating but did not have money or support
    - 8.3.2.2. Application of Manufacturers' Sound Data (1593 copies purchased)
      - 8.3.2.2.1. 2015 – 2016 updates planned
        - 8.3.2.2.1.1. Chapter 13 – John Dunlap
        - 8.3.2.2.1.2. Chapter 8 – Patrick Chinoda ([pchinoda@hartzell.com](mailto:pchinoda@hartzell.com)) (Recruit from TC 5.1?)
        - 8.3.2.2.1.3. Chapter
  - 8.3.3. Web page (Schwob/Meredith)
    - 8.3.3.1.
- 8.4. **Standards Subcommittee** (Clemente) [20 minutes]
  - 8.4.1. SPC 79 – Method of Test for Fan Coil Units (Eichelberger)
    - 8.4.1.1. Acoustic changes are still needed to mesh with AHRI
    - 8.4.1.2. Public comment period is closed
  - 8.4.2. SPC 130 – Method of Test for Rating Ducted Air Terminal Units (Zimmerman)
    - 8.4.2.1. Year delayed, goal of expanding for exhaust valves and exhaust boxes,
  - 8.4.3. SPC 189 – Design for High Performance Green Buildings (Miller-Klein)
    - 8.4.3.1. Jeff Boldt, 189.1 Update: 6 members of TC 2.6 working on the committee (Lilly, Roy, Schaffer, Bridger, Meredith, Miller-Klein); monthly meetings on Go-to-meeting, 189.1 WG 8 for review, IGCC and 189.1 work in cooperation for code review
  - 8.4.4. SPC 197 – Method of Test for Passive Vibration Isolators (J. Wang)
    - 8.4.4.1. Coordinate with ISO standards
  - 8.4.5. SPC 200 – Method of Test for Chilled Beams (Zimmerman)
    - 8.4.5.1. Completed with Gallery Proof (2015 printing)
  - 8.4.6. GPC 10 – Interactions Affecting the Achievement of Acceptable Indoor Environments (L. Wang)

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- 8.4.6.1. Guideline – Lily Wang is rolling off committee, need acoustical representative
- 8.4.6.2. EPA - \$6 million dollars of research funding
- 8.4.7. SPC 70 – Method of Testing Air Inlets and Air Outlets
  - 8.4.7.1. Membership is still pending, expansion of devices
- 8.4.8. Updates from Other Standards Organizations
  - 8.4.8.1. AHRI (Abbate)
    - 8.4.8.1.1. 270, 300 current under revision
    - 8.4.8.1.2. 370
    - 8.4.8.1.3. 220 – Reverberation Room Qualification
    - 8.4.8.1.4. 1280 – Sound Power of Radiating Air Cooled/Chiller
  - 8.4.8.2. AMCA (Brooks) – Rad Ganesh
    - 8.4.8.2.1. Notice of data availability, public review on DOE energy efficiency standards
  - 8.4.8.3. ANSI (Ali Herfat)
    - 8.4.8.3.1. Working Group on Sound Measurement in Rooms (Lilly)
  - 8.4.8.4. ASTM - E33 (Lilly)
    - 8.4.8.4.1. NEW: Noise Reduction of Doors
    - 8.4.8.4.2. E477 update in 2013
  - 8.4.8.5. ISO (Reynolds); ISO TC205/TC43.2 (Roy)
    - 8.4.8.5.1. Working Draft (Roy) – TC205/TC43.2 evaluating Indoor Environments
- 8.5. **Standing Subcommittees** [10 minutes]
  - 8.5.1. Sound Criteria (L. Wang)
    - 8.5.1.1. Completed Work Statement for Tones
  - 8.5.2. Vibration Isolation (J. Wang)
    - 8.5.2.1. Updated RTAR
- 8.6. **Operations Subcommittee** (LaForgia) [15 minutes]
  - 8.6.1. Bylaws (Meredith)
  - 8.6.2. Honors and awards (LaForgia)
    - 8.6.2.1. TC Committee of the Year for Section 2
  - 8.6.3. Long range planning (Meredith)
    - 8.6.3.1. 1<sup>st</sup> Jason Swan, 2<sup>nd</sup> Jerry Lilly, (14 yes, 1 chair - abstain)
    - 8.6.3.2. July 2015 – Andrew Mitchell, Criteria Subcommittee chair
  - 8.6.4. Membership (Schwob/LaForgia)
    - 8.6.4.1. Voting Member
      - 8.6.4.1.1. July 2015: Victor Clemente, Robert Hassler, Patrick Marks
  - 8.6.5. Liaisons (LaForgia)
    - 8.6.5.1. International Green Construction Code update (Miller-Klein)
    - 8.6.5.2. ASHRAE TC 2.1 Physiology and Human Environment (L. Wang)
      - 8.6.5.2.1. Research subcommittee – Ken Roy & Lily Wang attended, introduced RTAR on Tones, sponsoring program in St. Louis from EPA Interactions Studies
    - 8.6.5.3. ASHRAE TC 2.7 Seismic and Wind Restraint Design (Peterman)
      - 8.6.5.3.1. Robert Simmons meeting Tuesday January 27

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- 8.6.5.4. ASHRAE TC 5.1 Fan Design and Application (Osborn)
  - 8.6.5.4.1. SPC 171 on Test Method for Seismic Restraints
- 8.6.5.5. ASHRAE TC 5.2 Duct Design (Hassler)
  - 8.6.5.5.1. Duct Design Guide
  - 8.6.5.5.2. Duct fitting database
- 8.6.5.6. ASHRAE TC 5.3 Room Air Distribution (Zimmerman)
  - 8.6.5.6.1. AHRI 880/885 Air Terminals
  - 8.6.5.6.2. AHRI 1240 Performance Rating of Chilled Beams
  - 8.6.5.6.3. 2 Chapters in Handbook
- 8.6.5.7. ASHRAE TC 6.10 Fuels and Combustion (Herrin)
- 8.6.5.8. ASHRAE MTG.EAS (Eichelberger/Meredith)
  - 8.6.5.8.1. Coordination between TC and Standards
  - 8.6.5.8.2. Dissolved the MTG.EAS
- 8.6.5.9. ASA (L. Wang)
  - 8.6.5.9.1. 2015 Pittsburgh (May 18 – 22), TC Noise – Session on Tones in Built Environment (Wednesday or Thursday)
  - 8.6.5.9.2. 2015 Jacksonville (November)
  - 8.6.5.9.3. 2016 Spring – Salt Lake City
  - 8.6.5.9.4. 2016 Fall – Honolulu
- 8.6.5.10. VISCMA (Peterman)
  - 8.6.5.10.1. Updated website
- 8.6.5.11. CTI (Miller-Klein)
  - 8.6.5.11.1. Currently certifying sound test agencies for field
- 8.6.5.12. INCE (Lilly)
  - 8.6.5.12.1. Keynote Speaker: Mark Schaffer (9/2014), full session on HVAC Noise
  - 8.6.5.12.2. 2015 Inter-Noise in San Francisco (September)
- 8.6.5.13. NCAC (Bridger)
- 8.6.5.14. CIBSE (Swan)
- 8.6.5.15. EGSA (Simmons) – Electric Generation Society of America
  - 8.6.5.15.1. Muffler Standard published

## **9. New business/Old business [5 minutes]**

- 9.1. Review Scope of Committee

## **10. Next meeting date and location – Atlanta, GA; June 29<sup>th</sup>, 2015**

## **11. Adjournment**

- 11.1. 1<sup>st</sup> Doug Reynolds, 2<sup>nd</sup> Jerry Lilly

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ASHRAE TC2.6 Research Subcommittee Report, 01/26/2015, Chicago, IL.  
Curt Eichelberger ([curtis.eichelberger@jci.com](mailto:curtis.eichelberger@jci.com))

### Highlights of Research Chair's meeting:

- Harvey Sachs ([RL2@ashrae.net](mailto:RL2@ashrae.net)) is our liaison. Reminder that our Research Liaison, should review all RTARs and WS, should be invited to PMS meetings. Please copy Curt Eichelberger on all correspondence with the Research Liaison.
- There are no projects on hold for funding. RAC is well funded.
- RTARs due May 15, August 15 and December 15.
- RAC wants all Work Statements to have a phased approach. At the end of each phase there should be well defined deliverables, so that the PMS can assess the feasibility of the next phase and contractor's ability to complete the remainder of the project.

### 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. Over 120 tests on round and rectangular straight ducts have been completed by UNLV and E. H. Price. In general, the UNLV test results compare favorably with the E.H. Price test results.

This project is operating under a no-cost extension and Dr. Reynolds confessed that UNLV will not be able to complete all of the proposed tests because they are out of funds. The PMS asked for a matrix of tests yet to be conducted. After receiving the list, the PMS will prioritize the remaining tests and make a recommendation on what tests can be omitted. This should take place within the next few days. Once the specifics are known as to what tests will not be completed, the PMS will make a recommendation to ASHRAE Research as to whether or not to excuse the PI from the responsibility of the remaining tasks.

TC 2.6 voted to recommend a no-cost extension to January 31, 2016. This is the target completion date for the final report.

RP-1529 Full frequency numerical modeling of sound transmission in and radiation from lined ducts – Pat Marks, PMS Chair. Dr. David Herrin, University of Kentucky, principle investigator. This project will develop and validate full-frequency numerical modeling techniques for sound transmission through, and radiation from, HVAC ductwork. The Analysis models show good agreement with UNLV and E. H. Price test data for straight ducts. The PI expects to have a draft report completed in May 2015, just before the next meeting.

TC 2.6 voted to recommend a no-cost extension to January 31, 2016. This is the target completion date for the final report.

### Work Statements/RTARs:

RTAR-1707 Annoyance Thresholds of Tones in Noise as Related to Building Services Equipment. Lily Wang championed this RTAR. RAC conditionally approved the RTAR in their June 2013 meeting and instructed the TC to proceed with preparing the Work Statement. During the last three meetings of the Criteria Subcommittee, Lily Wang has prepared a WS which will be sent to the TC 2.6 voting members for letter ballot.

RTAR-1754 - Developing the Standard Test Method for Dynamic Characteristics of Vibration Isolators. Jack Wang and Jerry Lilly prepared a new draft of an RTAR (formerly RTAR-1560), with the scope of only developing a method of test. In September 2014 the TC 2.6 voted, by email, to approve -- the vote was unanimous. RAC conditionally approved the RTAR and the Vibration Subcommittee is moving forward with drafting the Work Statement.

Speech Privacy in High Performance Buildings – Ken Roy prepared RTAR and reviewed with members at the Research Subcommittee meeting. Next step, Ken will forward to other members for review and comment.

### **Topics discussed and prioritized for future research:**

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

1. **Speech Privacy in High Performance Buildings** – Ken Roy prepared and reviewed with members at Subcommittee meeting. Lilly Wang, Curt Eichelberger, Erik Miller-Klein, Doug Reynolds & Joe Bridger. We will likely be looking for input and support from TC2.1, SSSPC 189.1 and 189.3 (Babineau).
2. **Flow noise generation in ducts and fittings** – Greg Miller champion for this topic. We need a volunteer to do a literature review, as some of this information may already be published.
3. **Room effect** (include effect of single pass ceiling systems and ceiling plena) – Joe Bridger agreed to champion this topic and prepare an RTAR, along with Ken Roy and Erik Miller-Klein. This task should start with a good literature review.
4. **Plumbing noise** (defined in terms of flow and pressure drop) – PEX piping. Relationship between airborne and structureborn. Canadian data? Champion Erik Miller-Klein, Jerry, Chris
5. **Non-fibrous” duct liners** – Application related, not product ratings. No champion for this topic at this time.
6. **Fluctuation criteria** – Objective would be to develop a metric for Criteria section of Handbook. Criteria subcommittee decided to work on tone criteria first.

Added topics that were discussed, but not prioritized, include:

- **Criteria** - What is the basis for values that were chosen for room use. Need evidence based, rather than accepted design practice.
- **Flex duct** – Where does the sound go? Where should the duct end correction be applied?
- **IL in terminal units** – Why isn't this accounted for and is it important?
- **Vibration of HVAC equipment** - Develop a uniform method of reporting/rating vibration for HVAC equipment and evaluate typical vibration spectra for installed equipment.
- **With ASHRAE rebranding itself and promoting a boarder scope to include the built environment, we may want to consider added topics such as:**
  - Speech privacy/intelligibility.
  - Noise intrusion from outside or adjacent interior spaces.
  - Background noise consideration that extends beyond HVAC system noise, such as sound masking.
- **Self-noise generation of louvers and dampers.**
- **Dynamic properties of building floor/ceiling constructions.**

## ASHRAE TC 2.6 Programs Subcommittee Meeting Minutes

Meeting Date: January 25, 2015

Submitted by: Lauren Ronsse

*Meeting Attendees: Joe Bridger, Jerry Lilly, Dustin Meredith, Erik Miller-Klein, Raj Prime, Doug Reynolds, Lauren Ronsse, Ken Roy, Randy Zimmerman, Terence Tyson, Curt Eichelberger, Robert Hassler, Joe Horesco, Karl Peterman, Robert Simmons, John Sofra, Steve Wise, Eric Strum, France Cincetti, Mark Long, Jeremy Stockmans, Jennifer Nelson, Lawrence Copley*

### **Program Topics: Chicago 2015 (January 2015)**

Conference	Subject	Type	Status	Session Organizer
Chicago 2015 or Atlanta 2015	<b>Track 1: Systems and Equipment</b> (Track Chair: Andrea Zarour, <a href="mailto:azarour@greaterbaymechanical.com">azarour@greaterbaymechanical.com</a> ) Partnered with TC 5.3 - Air Distribution (co-sponsor): Randy Zimmerman Practical Seminar on Quieting Air Distribution Systems <ul style="list-style-type: none"> <li>• Duct Velocities</li> <li>• Insulation of VAVs</li> <li>• Radiated/Inlet Noise for Fan Powered Boxes</li> <li>• Pressure drop across the valve</li> </ul>		Not Submitted	Randy Zimmerman
Chicago 2015	<b>Track 4: Large Buildings: Mission Critical Facilities and Applications</b> (Track Chair: Joel Primeau, <a href="mailto:joel.primeau@wspgroup.com">joel.primeau@wspgroup.com</a> ) <ul style="list-style-type: none"> <li>• Generator Noise Control (Laforgia)</li> <li>• Transformer &amp; Generator Vibration Noise Control for upper level installations (Keith)</li> <li>• Manufacturer Perspective (Robert Simmons)</li> </ul>		Not Submitted	Mark Schaffer Jerry Lilly Reggie Keith Robert Simmons
Chicago	<b>Track 8: Hospital Design and Codes</b>	Seminar	Submitted	Erik Miller-

2015	Session Title: Design of Healthcare Facilities to Meet Standards of Acoustic Performance (Track Chair: Chuck Curlin, <a href="mailto:ccurling@shultzeng.com">ccurling@shultzeng.com</a> - This track explores design and code requirements to ensure patient comfort.) <ul style="list-style-type: none"> <li>• Speech Privacy (Ken Roy)</li> <li>• HCAHPS &amp; Alarm Fatigue (Erik Miller-Klein)</li> <li>• 2014 FGI Guidelines (Kenric Van Wyk)</li> </ul>		& Rejected	Klein
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**Upcoming Conference Program Tracks:**

**Atlanta 2015 (June 27 – July 1, 2015)**

Deadlines:

**September 22, 2014** – Conference & Technical Paper abstracts Due

**February 9, 2015** – Seminar and Forum Program Proposals Due

**June 5, 2015** – Presentations Due

- Track 1 HVAC&R Systems and Equipment
- Track 2 HVAC&R Fundamentals and Applications
- Track 3 Research Summit
- Track 4 Refrigeration
- Track 5 Building Operation, Maintenance, and Optimization/ Commissioning
- Track 6 Indoor Air Quality
- Track 7 Modeling throughout the Building Life Cycle
- Track 8 High Performance Buildings
- Track 9 Moving Advanced Energy Design Guidance to the Mainstream

**Orlando 2016 (January 23 – 27, 2016)**

Deadlines:

**March 23, 2015** – Conference Abstracts Due

**April 20, 2015** – Technical Papers Due

**July 6, 2015** – Conference Papers Due

**August 10, 2015** – Seminar, Forum, and Workshop Proposals Due

- Track 1 Systems and Equipment
- Track 2 Fundamentals and Applications
- Track 3 Design Build
- Track 4 International Design
- Track 5 Standards, Guidelines and Codes
- Track 6 Cutting-Edge Technologies

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Track 7 The Great Debate

*These sessions and papers will present divergent methods for accomplishing the same task.*

Track 8 Modern Residential Systems

**Saint Louis 2016 (June 25 – 29, 2016)**

Deadlines: TBD

**Program Topics: Atlanta 2015 (June 27 – July 1, 2015)**

**February 9, 2015** – Seminar and Forum Program Proposals Due

Conference	Subject	Type	Status	Session Organizer
Resubmit - Atlanta 2015	<b>Track 8 High Performance Buildings</b> <b>Session Topic: Green Building Acoustic Performance – LEED, IGCC, PMP Best Practices</b> <ul style="list-style-type: none"> <li>• Kenneth Roy</li> <li>• Lily Wang</li> <li>• Curt Eichelberger</li> </ul>	Seminar	To be submitted	Lily Wang
Atlanta 2015	<b>Track 5 Building Operation, Maintenance, and Optimization/Commissioning</b>  <b>Session Topic: Vibration Isolation</b> <ul style="list-style-type: none"> <li>• Workshop – Case Studies of Predicted vs. Actual (Jerry Lilly)</li> </ul>	Workshop	To be submitted	Erik Miller-Klein

**Program Topics: Orlando 2016 (January 23 – 27, 2016)**

**August 10, 2015** – Seminar and Forum Program Proposals Due

Conference	Subject	Type	Status	Session Organizer
Orlando 2016	<b>Track 1 Systems and Equipment</b> <b>Track 2 Fundamentals and Applications</b> <b>Track 3 Design Build</b> <b>Track 4 International Design</b> <b>Track 5 Standards, Guidelines and Codes</b> <b>Track 6 Cutting-Edge Technologies</b> <b>Track 7 The Great Debate</b> <b>Track 8 Modern Residential Systems</b>			

Orlando 2016	<b>Track 3 Design Build</b>  <b>Joint with TC 7.2 and 2.7</b> <b>Session Topic: Integrating Sound and Vibration in the Design Phase</b> <ul style="list-style-type: none"> <li>Plan to submit one case study talk from TC 2.6 to this program (will confirm in Atlanta)</li> </ul>	Seminar	Robert Simmons confirmed that TC 2.7 will hold this session and they would like one talk contributed from TC 2.6	Robert Simmons
Orlando 2016	<b>Track 5 Standards, Guidelines and Codes</b> <b>Session Title: Design of Healthcare Facilities to Meet Standards of Acoustic Performance</b> <ul style="list-style-type: none"> <li>Speech Privacy (Ken Roy)</li> <li>HCAHPS &amp; Alarm Fatigue (Erik Miller-Klein)</li> <li>2014 FGI Guidelines (Kenric Van Wyk)</li> </ul>	Seminar	To be submitted	Erik Miller-Klein
Orlando 2016	<b>Track 7 The Great Debate</b> <b>Session Topic: Active vs. Passive Ductborne Noise Control</b> <ul style="list-style-type: none"> <li>Passive Noise Control (Papadimos)</li> <li>Active Noise Control (Wise)</li> </ul>	Workshop	To be submitted	Steve Wise
Orlando 2016 or St. Louis 2016	<b>Track 8 Modern Residential Systems</b> <b>Session Topic: Acoustics in Multi-Family Residential Environments</b> Plumbing Noise (Papadimos/Lilly) Mechanical Ventilation Heat Recovery Units – noise varies widely with exact same performance (Swan) Sound isolation between units (sound and impact isolation) (Murello)	Seminar	Possible for Orlando – depends on if we need to resubmit sessions that are rejected in Atlanta	Murello?
Orlando 2016	<b>Track 5 Standards, Guidelines and</b>		Possible – E. Miller-	Erik Miller-Klein

	Codes Session Topic: Implementation of Acoustics in Standard 189.1		Klein will do hot topic on this in Atlanta, and TC will decide at that point we want to submit a session on this for Orlando	
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**Program Topics: Saint Louis 2016 (June 25 – 29, 2016)**

Conference	Subject	Type	Status	Session Organizer
St. Louis 2016	<b>Conference Paper Session (no specific track)</b>  <b>Session Topic: Basics of HVAC Noise Control</b> <ul style="list-style-type: none"> <li>• Duct Liner, Breakout &amp; Flanking (Doug Reynolds)</li> <li>• Round duct</li> <li>• Rectangular</li> <li>• Updated algorithms for insertion loss, break-out</li> </ul>	Conference Paper Session		Doug Reynolds
St. Louis 2016	<b>Session Topic: Acoustic/Thermal/Lighting Interactions in the Built Environment</b>		TC 2.1 is planning to submit a session on this topic in St. Louis – TC 2.1 may want a contribution from TC 2.6	Lily Wang shared this information with TC 2.6

**Future**

- Chilled Beams (Peterman)

- SPC 200 is developing ASHRAE standard on how to test chilled beams. AHRI is developing a rating for sound.
- This topic could possibly be in a session with a basics talk by Randy Zimmerman (possible topics for Zimmerman Talk: Duct Velocities, Insulation of VAVs, Radiated/Inlet Noise for Fan Powered Boxes, Pressure Drop Across the Valve)
- Possible Session Title: Practical Seminar on Quieting Air Distribution Systems (Atlanta or St. Louis)
  
- Elevator Noise Control (Lilly)
  
- Residential Track
  - **Session Title: Acoustics in Multi-Family Residential Environments**
    - Plumbing Noise (Papadimos/Lilly)
    - Mechanical Ventilation Heat Recovery Units – noise varies widely with exact same performance (Swan)
    - Sound isolation between units (sound and impact isolation) (Murello)
  
- Advanced Topics and/or Conference Paper Submissions
  - Speech Privacy
  - Interior Noise with Low Noise Open Offices

### 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 be sure to compile all information for submitted sessions in word document, so that the sessions can be easily resubmitted for future conferences if session is rejected.

### Highlights from Program Chair Meeting

- Speaker presentations are due 1 month prior to meeting for commercialism review
- Will be mandatory for speakers to use an ASHRAE-developed template for all presentations at meetings starting with the Orlando meeting (choices of templates will be available on ASHRAE website).
- If seminar is rejected, it is possible to request that the seminar still occur during TC time → presentations still subject to commercialism review and program is published in meeting program
- Workshop Submissions (new in Seattle)
  - Submissions must include selected speakers, bios, abstract, learning objectives, Q&A
  - 60-minute session only: 30 minutes for presentations + 30 minutes for Q&A
  - Minimum of two speakers + moderator

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Publications Subcommittee Meeting  
January 25, 2015  
Chair: Steve Wise

Applications Handbook CHAPTER 48, 2015 book revision

Galley Proofs should be ready in March? So far, so good.

Fundamentals Handbook, 2017 revision

Eric Sturm has taken the first look at it to start the rev cycle. There was no further action. Looks good.

Other pubs -

1. Website – Mike Schwob was not in attendance, so nothing was discussed here other than that the collection of Presos from past conferences may need an update.
2. Algorithms – Greg Miller (with help from Dustin Meredith and Doug Reynolds) is going to take a look at the 20-year old publication that ASRHAE once sold and determine: 1) accuracy of equations, 2) possible additions/removals, 3) format, etc. Then, perhaps at the next meeting in Atlanta, we will decide if we want to consider making it available again to the general membership.
3. HANDBOOK REFORMAT / ALT VERSIONS SUCH AS ASHRAE ON-LINE – We had a long brainstorming session about:
  - A. What might we be able to make available on-line that is prohibited by page length, format (audio files, spreadsheet), or page-by-page vs click-to-click convenience?
  - B. Could this expanded chapter include stuff from other publications like the Ebbing/Blazier book and serve as i) a self-contained reference, and ii) an updatable reference.?
  - C. How do we administer updates?
  - D. What format?
  - E. Will ASHRAE support the concept?

TO-DO: By June, a volunteer group (Steve Wise, Reggie Keith, Jack Wang, Erik Miller-Klein) might take a stab at it, such as with the Vibration Section.

Application of Manufacturer Sound Data Guide – We have agreed to do a re-write, with the first step being a review of each current chapter by a couple of volunteers each.  
 As a background to judge the audience for this work, we know that sales of these books to date are:

- Application of Manufacturers' Sound Data:** 1593 copies
- Practical Guide to Noise and Vibration Control for HVAC Systems, Second Edition (I-P):** 1622 copies
- Practical Guide to Noise and Vibration Control for HVAC Systems, Second Edition (SI):** 223 copies

We would like to figure out the scope of necessary revisions (reference updates, deletion of redundancies re: Handbook, and any new ideas) within a month or two, and perhaps have ~90% drafts by the June meeting in Atlanta. Volunteers are as follows:

			<b>Manufacturer</b>	<b>Consultant</b>
<b>Chapter 4—Fan Noise Characteristics Tutorial</b>			Dustin Meredith	Erik Miller-Klein
<b>Chapter 5—Central-Station Air-Handling Units</b>			Curt Eichelberger	Chris Papadimos
<b>Chapter 6—Commercial Packaged HVAC Equipment</b>			Curt Eichelberger	Chris Papadimos
<b>Chapter 7—Silencers for HVAC Systems</b>			Dan LaForgia / Andrew Mitchell	Jerry Lilly
<b>Chapter 8—Roof Ventilators</b>			Rad Ganesh / Pat Chinoda	John Murphy
<b>Chapter 9—Panel-Type Propeller Exhaust Fans</b>			Rad Ganesh / Pat Chinoda	John Murphy
<b>Chapter 10—Grilles, Registers, and Diffusers</b>			Randy Zimmerman	Joe Bridger
<b>Chapter 11—Air Terminals</b>			Randy Zimmerman	Chris Papadimos
<b>Chapter 12—Room Fan Coil Units</b>			Randy Zimmerman	Chris Papadimos
<b>Chapter 13—Centrifugal Water Pumps</b>			?	John Dunlap / Jery Lilly
<b>Chapter 14—Air-Cooled Chillers / CondensERS</b>			Pat Marks	Jerry Lilly
<b>Chapter 15—Water-Cooled Chillers</b>			Pat Marks	Jerry Lilly
<b>Chapter 16—Cooling Towers</b>			Erik Miller-Klein	SPX ?
<b>Other New Topics?</b>				
	<b>Chilled Beams</b>		Karl Peterman	
	<b>Generators</b>			
	<b>Transformers</b>			
	<b>VRF / Split Systems</b>			

**TC 2.6 Criteria Subcommittee  
Meeting Minutes - Chicago, IL  
January 26<sup>th</sup> 2015**

*Attendees: J. Bridger, L. Copley, C. Eichelberger, J. Horesco, D. Laforgia, J. Lilly, P. Marks, D. Meredith, G. Miller, E. Miller-Klein, A. Mitchell, M. Murello, C. Papadimos, D. Reynolds, K. Roy, J. Swan, T. Tyson, B. Reynolds, J. Wang, L. Wang, S. Wise,*

- I. Scope/purpose of the criteria committee: “To define and promote measurement protocols and benchmarks/guidelines/criteria to evaluate building acoustics, as related to building mechanical systems”
  
- II. Setting criteria for other spaces
  - A. J. Lilly expressed interest in the committee considering adding criteria for other spaces that are not currently on the table; and if data are lacking to support those criteria, then requesting additional work in those areas.
  - B. This topic will be discussed in greater length at the next Criteria subcommittee meeting in Atlanta.
  
- III. Development of Work Statement on Tones
  - A. Fine-tuning of Work Statement (WS)
    1. A review of the work statement to date was conducted.
      - a. There was some interest in changing 240 Hz to 300 Hz, but the committee decided that keeping it at 240 Hz is fine for now.
      - b. There was some interest in adding a fluctuating signal for comparison, to give ‘ammunition’ for next round of research studies on fluctuating tones. L. Wang expressed that there is already some of this data out there, and adding one additional data point (in this WS) will not be sufficient to make the case in her opinion.
    2. Deliverables
      - a. The specific phases of the project were refined, and deliverables associated with those phases outlined.
    3. Evaluation Criteria
      - a. Subcommittee considered the ASHRAE generic criteria for evaluation, and modified the percentages slightly between facilities and qualifications.
  
  - B. Work Statement Cover Page

1. Potential bidders were reviewed. No additional suggestions were made.
2. PES/PMS representatives
  - a. A number of persons volunteered to serve on the Project Evaluation Subcommittee (PES) and subsequently on the Project Monitoring Subcommittee (PMS). These names will be discussed further with TC 2.6 chair for final nominations.

#### IV. Leadership Succession

- A. L. Wang plans to step down as Criteria Subcommittee Chair in June 2015, and A. Mitchell has agreed to roll on as the new Chair for 2015-16.

#### V. Action Items

- A. L. Wang will forward WS to RAC representative (H. Sachs) for his review.
- B. L. Wang will work with TC 2.6 chair (D. Meredith) on finalizing PES/PMS committee make-up.
- C. Subsequently, Work Statement will be sent to TC 2.6 and TC 2.1 voting members for approval.
- D. The aim is to submit the TC-approved Work Statement to RAC for consideration at their next meeting.