

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

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.	<u>2.6</u>	DATE	<u>June 29, 2015</u>
TC/TG/MTG/TRG TITLE	<u>Sound and Vibration</u>		
DATE OF MEETING	<u>June 29, 2015</u>	LOCATION	<u>Atlanta, GA</u>

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Voting Members: Bridger, Joseph Dunlap, John LaForgia, Dan Meredith, Dustin Miller-Klein, Erik Osborn, Kim Prime, Raj Ronsse, Lauren Roy, Kenneth Schwob, Michael Swan, Jason Zimmerman, Randal Corresponding Members: Abbate, Daniel Carroll, David Chinoda, Zvirimumwoyo Eichelberger, Curt Hassler, Robert Kline, Jim Marks, Patrick Maruthuria, Parag Meisel, Paul Michaud, Alexander Mitchell, Andrew Peterman, Karl Sofra, John Wang, Jack Wang, Zhiping Wise, Steve		Voting Members: Lilly, Jerry Murello, Matthew Papadimos, Chris Reynolds, Douglas Tyson, Terence Corresponding Members: Alkhalil, Rami Babich, Jeffrey Babineau, Francis Bastasch, Mark Berardi, Umberto Boldt, Jeffrey Broner, Norman Busch, Todd Bushnell, Peter Clemente, Victor Cuff, Nicole Deveci, Martin Eaton, Erroll Eligator, Ronald Fly, Mark Froehlich, Michael Gaghan, Kevin Ganesh, Radha George, Jason Gierzak, John Goodfriend, Lewis		Visitors: Cincotti, Franco Hooti, Matthew Iacobellis, John Jakobs, Diane Leventhall, Geoff Meredith, Dave Nelson, Jennifer Nutter, Darin Smith, Mark Vaughn, Michael

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
		Guenther, Brian Guney, Ali Kemal Hallstrom, Arthur Herfat, Ali Horesco, Joseph Keating, Michael Keith, Reginald Khati, Manoj Kloostra, Marvin Kowald, Will Lai, Kevin Lau, Eddie Lilkendey, Robert Mattocks, Charles Meeuwsen, Greg Miller, Gregory Muehleisen, Ralph Nepomuceno, Jose Oliver, Patrick Pappas, John Peppin, Richard Pooler, James Resetar, Michael Reynolds, Brian Rockwood, William Ryherd, Erica Sachwald, Benjamin Schaffer, Mark Shook, Ken Simcoe, Tim Simmons, Robert Spencer, Michael Stewart, William Sylvestre-Williams, Nicholas Wang, Lily Weinstein, Jonathan Wowk, Roman Zybura, Jack		

DISTRIBUTION

All Members of TC/TG/MTG/TRG plus the following:

TAC Section Head:	Elbert Phillips
TAC Chair:	Thomas Lawrence
All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters:	Sheila Hayter Cameron Labunski Cyrus Nasser Bryan Holcomb Michael Vaughn Chris Fudge
Manager Of Standards: Manager Of Research & Technical Services:	Stephanie Reiniche Mike Vaughn

DRAFT

ASHRAE TC 2.6 Sound and Vibration Control

Meeting Minutes with Subcommittee Minutes

2:15-4:15 PM Monday, June 29th, 2015

Salon E – Atlanta Hilton 2nd Floor – Atlanta, GA

NOTE: All Task Group Chairs and Subcommittee Chairs are asked to submit written report to the Secretary (Erik Miller-Klein) before July 20th.

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)."
 - 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 prior meeting's minutes** (Miller-Klein) [3 minutes]
 - 4.1. **Ken Roy (1st), Joe Bridger (2nd): votes 10 - 0 - 0 (unanimous)**
5. **Secretary's report** (Miller-Klein) [3 minutes]
6. **TC Chair's meeting report** (Meredith) [5 minutes]
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
 - 8.1.2. 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)
 - 8.1.2.2. RP-1529 *Full-Frequency Numerical Modeling of Sound Transmission in and Radiation from Lined Ducts* with PI Herrin/UK (Marks)
 - 8.1.3. Work Statements/RTAR's:
 - 8.1.3.1. WS-1707 *Annoyance Threshold of Tones in Noise as Related to Building Services Equipment* (L. Wang)
 - 8.1.3.1.1. **VOTE: John Dunlap (1st), Kim Osborn (2nd): 12 - 0 - 0 (unanimous)**
 - 8.1.3.2. WS-1754 *Developing the Standard Test Method for Dynamic Characteristic of Vibration Isolators* (J. Wang)
 - 8.1.3.3. RTAR-**** *Speech Privacy in High Performance Buildings* (Roy)
 - 8.1.4. Topics for future research
 - 8.1.4.1. Fluctuation criteria
 - 8.1.4.2. Room effects
 - 8.1.4.3. Flow noise
 - 8.1.4.4. Noise intrusion to interior spaces (Miller-Klein)
 - 8.1.4.5. Raised Floor attenuation with TC5.3 (Zimmerman)
 - 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. Workshop 3: *Acoustic Mitigation for Lightweight Roof Assemblies* (Miller-Klein)
 - 8.2.2.2. Seminar 55: *Green Building Acoustics: Making Green Sound Good* (Marks)

- 8.2.2.3. Hot topics this meeting
 - 8.2.2.3.1. ASHRAE Standard 189.1 Update (Miller-Klein/Bridger)
- 8.2.3. Potential programs next meeting – Orlando, January 2016
- 8.3. **Publications Subcommittee** (Wise) [10 minutes]
 - 8.3.1. Handbook chapters
 - 8.3.1.1. Handbook Fundamentals 2017 (Weinstein/Wise)
 - 8.3.1.2. Handbook Applications 2019 (Wise)
 - 8.3.2. Other publications
 - 8.3.2.1. Algorithms for HVAC Acoustics
 - 8.3.2.2. Application of Manufacturers' Sound Data
 - 8.3.3. Web page (Schwob)
- 8.4. **Standards Subcommittee** (Clemente) [20 minutes]
 - 8.4.1. SPC 70 – Method of Testing for Rating the Performance of Air Outlets and Air Inlets (Zimmerman?)
 - 8.4.1.1.
 - 8.4.2. SPC 79 – Method of Test for Fan Coil Units (Eichelberger)
 - 8.4.3. SPC 130 – Method of Test for Rating Ducted Air Terminal Units (Zimmerman)
 - 8.4.3.1.
 - 8.4.4. SPC 189 – Design for High Performance Green Buildings (Miller-Klein/Bridger)
 - 8.4.4.1. Presenting to Working Group 8
 - 8.4.5. SPC 197 – Method of Test for Passive Vibration Isolators (J. Wang)
 - 8.4.5.1. Disbanding until Research Completely, currently Work Statement phase
 - 8.4.6. SPC 200 – Method of Test for Chilled Beams (Zimmerman)
 - 8.4.7. GPC 10 – Interactions Affecting the Achievement of Acceptable Indoor Environments (open)
 - 8.4.8. Updates from Other Standards Organizations
 - 8.4.8.1. AHRI (Abbate)
 - 8.4.8.1.1. 270, 300, 350 in update process
 - 8.4.8.2. AMCA (Brooks)
 - 8.4.8.2.1. No updates
 - 8.4.8.3. ANSI (Ali Herfat)
 - 8.4.8.3.1. S12.72-2015 Published Standard on Sound Measurement in Rooms (Lilly)
 - 8.4.8.4. ASTM (Peppin)
 - 8.4.8.4.1. Committee E33 on Building and Environmental Acoustics (Lilly)
 - 8.4.8.4.2. E447 Round Robin Silencer Testing underway
 - 8.4.8.5. ISO (Reynolds)
 - 8.4.8.5.1. ISO TC205/TC43.2 Evaluating Indoor Environments (Roy)
 - 8.4.8.5.1.1. IEQ in Buildings
 - 8.4.8.5.1.2. Working Group 27 - Acoustic Comfort
- 8.5. **Standing Subcommittees** [10 minutes]
 - 8.5.1. **Sound Criteria** (Mitchell)
 - 8.5.1.1. Discussion on the direction of criteria moving forward - 1. background noise criteria; 2. intrusive noise; 3. fluctuations and sound quality index
 - 8.5.2. **Vibration Isolation** (J. Wang)

- 8.6. **Operations Subcommittee** (LaForgia) [15 minutes]
 - 8.6.1. Bylaws (Meredith)
 - 8.6.1.1. Removed bylaws from the website, potentially link to main ASHRAE.org page
 - 8.6.2. Honors and awards (LaForgia)
 - 8.6.2.1. Technical Paper, Poster Presentation, & Homer Adams Awards for 1517-RP *Validation of a Low-Order Acoustic Model of Boilers and its Application for Diagnosing Combustion Driven Oscillations* (TC 6.10)
 - 8.6.2.1.1. Dr. Herrin won in 2015
 - 8.6.3. Long range planning (Meredith)
 - 8.6.3.1. New Chair for 2015-2016
 - 8.6.3.1.1. July 1st - Dan LaForgia
 - 8.6.4. Membership (Schwob)
 - 8.6.4.1.
 - 8.6.5. Liaisons (LaForgia)
 - 8.6.5.1. ASHRAE TC 2.1 Physiology and Human Environment (Roy)
 - 8.6.5.1.1. June 30th Main Meeting
 - 8.6.5.1.1.1. RTAR on Speech Privacy for co-sponsor
 - 8.6.5.1.1.2. Work Statement on Tones
 - 8.6.5.1.1.3. Co-sponsor for Orlando presentation
 - 8.6.5.2. ASHRAE TC 2.7 Seismic and Wind Restraint Design (Peterman)
 - 8.6.5.2.1. June 30th Main Meeting
 - 8.6.5.2.1.1. Revising 171 method of test for seismic restraints
 - 8.6.5.2.1.2. PMS on wind testing for shielding
 - 8.6.5.3. ASHRAE TC 5.1 Fan Design and Application (Osborn)
 - 8.6.5.3.1. June 29th after TC2.6
 - 8.6.5.3.1.1. RTARs in development
 - 8.6.5.3.1.2. DOE relation update
 - 8.6.5.4. ASHRAE TC 5.2 Duct Design (Hassler)
 - 8.6.5.4.1. June 30th Meeting
 - 8.6.5.4.1.1. Rewording scope to include air flow and turbulence noise
 - 8.6.5.4.1.2. Duct Design Guide
 - 8.6.5.4.1.3. Duct fitting database
 - 8.6.5.5. ASHRAE TC 5.3 Room Air Distribution (Zimmerman)
 - 8.6.5.5.1. June 30th Meeting
 - 8.6.5.5.1.1. Handbook on Room Air Distribution not updated in 2015 section
 - 8.6.5.5.1.2. Terminal unit design guide in works
 - 8.6.5.5.1.3. AHRI 880/885 Air Terminals
 - 8.6.5.5.1.4. AHRI 1240 Performance Rating of Chilled Beams
 - 8.6.5.6. ASHRAE TC 6.10 Fuels and Combustion (Herrin)
 - 8.6.5.6.1.
 - 8.6.5.7. ASA (Roy?)
 - 8.6.5.7.1. Public Policy - Noise of public accommodations, potentially develop a noise standard in restaurants: ASA declined
 - 8.6.5.7.1.1. ASTM or ASHRAE interest in addressing classification standard for restaurant noise
 - 8.6.5.7.1.1.1. Initiate with TAC to find best avenue
 - 8.6.5.7.1.1.2. Concept: Green, Blue, Orange, Red, Black with respect to speech intelligibility within space
 - 8.6.5.7.2. ANSI S12.2 - Criteria reopened for discussion

- 8.6.5.8. VISCMA (Peterman)
 - 8.6.5.8.1. FEMA manuals, republished by VISCMA for means and methods for MEP
- 8.6.5.9. CTI (Miller-Klein)
 - 8.6.5.9.1. ATC-128 Sound Testing, paper proposed by Miller-Klein
- 8.6.5.10. INCE (Lilly)
- 8.6.5.11. NCAC (Bridger)
 - 8.6.5.11.1. Article in newsletter to get NCAC involved in ASHRAE
- 8.6.5.12. CIBSE (Swan)
 - 8.6.5.12.1. Updated all of these noise standards 4 years ago, expect another 3 or 4 years before additional edits
- 8.6.5.13. EGSA (Simmons)
 - 8.6.5.13.1. Electrical Generation (Genset) came out with 5th edition of performance with chapter on acoustics - noise, vibration isolation, seismic restraints, recommended practice for silencer ratings for generators and generator packages

9. New business/Old business [5 minutes]

- 9.1. Finalize Scope of Committee - 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.

9.1.1. VOTE: Jason Swan (1st), Michael Schwob (2nd), Kim Osborn (3rd); 12 - 0 - 0 (unanimous)

10. Next meeting date and location – Orlando, FL; January 25th, 2016

11. Adjournment at 4:00 (15 minutes early)

Research subcommittee meeting minutes:

06/29/2015, Atlanta, GA.

Curt Eichelberger (curtis.eichelberger@jci.com)

Highlights of Research Chair's meeting:

- Effective July 1, Harvey Sachs will be rolling off and Pawel Wargocki will be rolling on as our liaison. Reminder that our Research Liaison, should review all RTARs and WS, should be invited to PMS meetings (RL2@ashrae.net). Please copy Curt Eichelberger (curtis.eichelberger@jci.com) on all correspondence with the Research Liaison.
- There are no projects on hold for funding. RAC is well funded.
- RAC meets minimum of 4 meetings per year, but will go to 6 to 8 meetings to process the workload.
- *Stage Funding and Project Monitoring* - RAC wants all Work Statements to have a Milestone Chart. 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.
- Alignment of Research with Society's 2014 strategic Plan - Renewed focus on Residential applications.

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. The PMS met via teleconference on June 18, 2015. Dr. Reynolds confirmed that UNLV will not be able to complete all of the tests proposed for this project because they are out of funds. UNLV is expecting to be able to complete the insertion loss testing of all the elbow test specimens and the 20-ft and 30-ft long 24"x24" straight rectangular ducts by the end of summer. The following tests will not be conducted: 1) the branch take-off tests, 2) insertion loss tests for 40-ft long ducts (due to UNLV personnel safety concerns) and 3) the vibration and sound intensity measurements that were added to the project scope in 2010 to support the duct breakout work in RP-1529.

TC 2.6 voted to recommend a no-cost extension to January 31, 2016, during the Chicago meeting. 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 distributed a draft report in June 2015, just before the ASHRAE meeting in Atlanta. Also, two papers were submitted for the Kansas City meeting, which were accepted with minor corrections. TC 2.6 voted to recommend a no-cost extension to January 31, 2016, during the Chicago meeting. This is the target completion date for the final report.

Work Statements/RTARs:

WS-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 went through

some minor edits by our research liaison. TC 2.6 unanimously voted to approve the WS, and TC 2.1 unanimously voted to co-sponsor the WS at the Atlanta meeting.

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 a RTAR and reviewed with members at the Research Subcommittee meeting. Next steps is to forward the draft to TC 2.6 and TC2.1 members for review and comment. We will also solicit support from Environmental Health Council.

Sound Attenuation of Underfloor Air Systems – This research was proposed by TC5.3 and TC2.6 expressed interest in sponsoring this research. Champions are Randy Zimmerman and Curt Eichelberger.

Topics discussed and prioritized for future research:

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

1. Fluctuation criteria (11 votes) – Objective would be to develop a metric for Criteria section of Handbook. Criteria subcommittee decided to work on tone criteria first. Looking for a Champion to prepare RTAR. Proposal was to bring in an outside expert on sound quality to provide guidance.

2. Room effect (9 votes) – Revisit and provide more clarity on how to calculate the room effect in the Handbook. This would include the 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.

3. Flow noise generation in ducts, fittings, louvers and dampers (7 votes) – Greg Miller agreed to champion for this topic. We need a volunteer to do a literature review, as some of this information may already be published.

4. Noise intrusion from outside or adjacent interior spaces (6 votes) – Champion: Erik Miller-Klein.

5. Dynamic properties of building floor/ceiling constructions (6 votes) – Need Champion.

6. Non-fibrous” duct liners (4 votes) – Application related, not product ratings. No champion for this topic at this time.

7. Criteria (3 votes) – What is the basis for values that were chosen for room use. Need evidence based, rather than accepted design practice.

8. Plumbing noise (1 votes) (defined in terms of flow and pressure drop) – PEX piping. Relationship between air-borne and structure-borne. Canadian data? Champion Erik Miller-Klein, Jerry, Chris

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

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.

Programs subcommittee meeting minutes:

06/28/2015, Atlanta, GA.

Lauren Ronsse (lronsse@colum.edu)

Meeting Attendees: Lauren Ronsse, Eric Sturm, Dustin Meredith, Dan LaForgia, Jason Swan, Erik Miller-Klein, Michael Schwob, Parag H. Mathuria, Andrew Mitchell, Robert Hassler, Jim Kline, Steve Wise, Curt Eichelberger, Franco Cincotti, Brian Reynolds, Kim Osborn, Jack Wang, Michelle Patrick

Programs Subcommittee Meeting Overview:

- Plan TC 2.6 program submissions for next two meetings
 - Orlando 2016 (January 23 – 27, 2016)
 - Saint Louis 2016 (June 25 – 29, 2016)
- Discuss tentative TC 2.6 program ideas for future meetings
 - Las Vegas 2017 (January 28 – February 1, 2017)
 - Long Beach, CA 2017 (June 24 – 28, 2017)
 - Chicago 2018 (January 20 – 24, 2018)

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*
- 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
- 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

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

Conference	Subject	Type	Status	Session Organizer
Atlanta 2015	<p>Track 8 High Performance Buildings</p> <p>Session Title: Green Building Acoustics: Making Green Sound Good</p> <ul style="list-style-type: none"> • Global Developments in Green Building IEQ-Acoustic Comfort (Kenneth Roy) • Best Practice for Evaluating and Improving the Acoustic Performance of Commercial Buildings (Curt Eichelberger) • Synergies Between High Performance Buildings and Good Acoustics (Ralph Muehleisen) 	Seminar	Accepted – Wednesday, 7/1, 8 – 9 AM, Salon E	Erik Miller-Klein
Atlanta 2015	<p>Track 5 Building Operation, Maintenance, and Optimization/Commissioning</p> <p>Session Title: Acoustic Mitigation for Lightweight Roof Assemblies</p> <ul style="list-style-type: none"> • Using the Vibration Isolation Section of Chapter 48 of 2015 HVAC Applications Handbook (Steve Wise) • Case Study: Noise and Vibration Control for HVAC Units Containing Pure Tones (Jerry Lilly) 	Workshop	Accepted – Sunday, 6/28, 9:45 – 10:45 AM, Salon A/B	Erik Miller-Klein

TC 2.6 Hot Topics: Atlanta 2015

- ASHRAE Standard 189.1 Update (Erik Miller-Klein)

Upcoming Conference Program Tracks:

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

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:

September 14, 2015 – Conference Abstracts Due

September 14, 2015 – Technical Papers Due

January 4, 2016 – Conference Papers Due

February 8, 2016 – Seminar, Forum, and Workshop Proposals Due

Track 1 Advances in Refrigeration Systems and Alternative Refrigerants

Track 2 Research Summit

Track 3 Fundamentals and Applications

Track 4 HVAC Systems and Equipment

Track 5 Smart Building Systems/Remote Monitoring and Diagnostics

Track 6 Indoor Environment: Health, Comfort, Productivity

Track 7 Professional Skills Beyond Engineering

Track 8 Renewable Energy Systems and Net Zero Buildings

Las Vegas 2017 (January 28 – February 1, 2017)

Deadlines: TBD

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

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

Conference	Subject	Type	Status	Session Organizer
Orlando 2016	<p>Track 5 Standards, Guidelines and Codes</p> <p>Session Title: Design of Healthcare Facilities to Meet Standards of Acoustic Performance</p> <ul style="list-style-type: none"> • Speech Privacy (Ken Roy) • HCAHPS & Alarm Fatigue (Erik Miller-Klein) • 2014 FGI Guidelines (Kenric Van Wyk) 	Seminar	To be submitted	Erik Miller-Klein
Orlando 2016	<p>Track 8 Modern Residential Systems</p> <p>Session Topic: Acoustics in Multi-Family Residential Environments</p> <p>Plumbing Noise (Papadimos/Lilly)</p> <p>Mechanical Ventilation Heat Recovery Units – noise varies widely with exact same performance (Swan)</p> <p>Sound isolation between units (sound and impact isolation) (Murello)</p> <p>AHRI 275 Residential Outdoor Condensing Units (Erik Miller-Klein)</p>	Seminar	To be submitted	Chris Papadimos
Orlando 2016	<p>Track 3 Design Build</p> <p>Joint with TC 7.2 and 2.7</p> <p>Session Topic: Integrating Sound and Vibration / Seismic and Wind Design in the Design Phase</p> <ul style="list-style-type: none"> • Plan to submit one case study talk from TC 2.6 to this program 	Seminar	TC 7.2 will submit this session and they would like one talk contributed from TC 2.6	Robert Simmons

Program Topics: Saint Louis 2016 (June 25 – 29, 2016)

September 14, 2015 – Conference Abstracts Due

September 14, 2015 – Technical Papers Due

January 4, 2016 – Conference Papers Due

February 8, 2016 – Seminar, Forum, and Workshop Proposals Due

Conference	Subject	Type	Status	Session Organizer
St. Louis 2016	<p>Track 1 Advances in Refrigeration Systems and Alternative Refrigerants</p> <p>Track 2 Research Summit</p> <p>Track 3 Fundamentals and Applications</p> <p>Track 4 HVAC Systems and Equipment</p> <p>Track 5 Smart Building Systems/Remote Monitoring and Diagnostics</p> <p>Track 6 Indoor Environment: Health, Comfort, Productivity</p> <p>Track 7 Professional Skills Beyond Engineering</p> <p>Track 8 Renewable Energy Systems and Net Zero Buildings</p>			
St. Louis 2016	<p>Track 2 Research Summit</p> <p>Session Topic: Update on TC 2.6 research</p> <ul style="list-style-type: none"> • Tones/Fluctuations (Lily Wang?) • Vibration Isolation (Jack Wang) • Speech Privacy (Ken Roy?) • Numerical Modeling (Herrin)? • Duct Lining (D. Reynolds)? 	Seminar or Workshop	To be submitted	Erik Miller-Klein
St. Louis 2016	<p>Session Topic: Acoustic/Thermal/Lighting Interactions in the Built Environment</p>	?	TC 2.1 is planning to submit a session on this topic in St. Louis – TC 2.1 may	Ken Roy and Curt Eichelberger will attend TC 2.1 meeting to verify that

			want a contribution from TC 2.6	this will happen
St. Louis 2016	Track 6 Indoor Environment: Health, Comfort, Productivity Session Topic: Implementation of Acoustics in Standard 189.1		Possible depending on status of acoustics in standard	Erik Miller-Klein
St. Louis 2016 or Las Vegas 2017	Conference Paper Session (no specific track) Session Topic: Numerical Analysis (RP 1529)	Conference Paper Session OR Transactions Paper Session	Possible – official session must happen after RP approved	Dave Herrin has submitted papers related to this topic
St. Louis 2016 or Las Vegas 2017	Conference Paper Session (no specific track) Session Topic: Basics of HVAC Noise Control <ul style="list-style-type: none"> • Duct Liner, Breakout & Flanking (Doug Reynolds) • Round duct • Rectangular • Updated algorithms for insertion loss, break-out 	Conference Paper Session	Possible – official session must happen after RP approved	Doug Reynolds

Future

- Advanced Topics and/or Conference Paper Submissions (possible for St. Louis if not participating in TC 2.1 session)
 - Speech Privacy
 - Interior Noise with Low Noise Open Offices
- Practical Seminar on Quieting Air Distribution Systems (Peterman) – possible for St. Louis or Las Vegas
 - Chilled beams (Peterman)
 - SPC 200 developed ASHRAE standard on method of test for chilled beams. The standard is complete and available for purchase.

- Another basics talk by Randy Zimmerman (possible topics: Duct Velocities, Insulation of VAVs, Radiated/Inlet Noise for Fan Powered Boxes, Pressure Drop Across the Valve)
- Elevator Noise Control (Lilly)

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.
- 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

TC 2.6 Feedback to ASHRAE Conference Programs Manager

- Please do not send new instructions for presenters on Friday afternoon prior to the conference starting
- Need better graphics designer for presentation templates (especially when use of templates is required!)
- Please allow use of larger cursor to use as pointer during presentations
- Please let the speakers know (in all communication with speakers) that they must plan to be present by noon day before their presentation if they want to review or make minor tweaks to their presentations on site
- The audio connection from laptop to loudspeakers consistently has not worked in the conference rooms, though the speaker asked for it

in the initial submission (this is a recurring problem for TC 2.6, as many of our presentations include sound)

- If TC 2.6 decides to hold a rejected session during our TC meeting time (have it published in program, etc.), can the session be resubmitted for a later meeting to be held in a normal conference room if the session is well-received?

Highlights from Atlanta programs subcommittee chairs meeting

*ASHRAE will provide free registration for **5** invited speakers if they meet the following criteria:

- Subject matter expert
- Cannot be an ASHRAE member
- Provide information relevant to ASHRAE

The proposed invited speakers shall be submitted with the respective program submission, and will be reviewed concurrent to the submission review process.

*Potential Sources Bias Disclosure

*TC 2.6 can make suggestions for tracks at upcoming conferences – let TC 2.6 chair know what they are, and they can submit on the activities report.

*Can make a note in the notes section of the programs submission process regarding any special requests (i.e., dates session cannot be held, co-sponsoring TC, any other special requests)

Reference Information: Track Descriptions

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 Chair: Gary C. Debes

Email: gcdebes@verizon.net

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: Cynthia Moreno

Email: cindym@tmmechanical.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: Design Build**

Track Chair: James Liston

Email: jfliston@verizon.net

Joining the contractor and the designer into the same team, the design-build method of project delivery is increasing in percentage of projects awarded in the US. This track explores the challenges and benefits of D-B project delivery. Highlight successful projects; discuss contracts; review management responsibilities; offer alternative design and construction processes. These topics and more will be included.

- **Track 4: International Design**

Track Chair: Leon Shapiro

Email: leoneshapiro@gmail.com

Design for various environmental elements, geography and culture demand that new and innovative strategies be developed. As an international organization, ASHRAE strives to meet the needs of a global membership. HVAC&R systems vary globally and this track provides an opportunity to share innovative and necessary design elements that can be shared internationally.

- **Track 5: Standards, Guidelines and Codes**

Track Chair: Michael Collarin

Email: Michael.Collarin@parsons.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 6: Cutting-Edge Technologies**

Track Chair: Ann Peratt

Email: agregg.ksu@gmail.com

As energy codes become increasing more stringent, we are challenged to find creative ways to improve efficiencies in the effort to achieve net zero buildings. This track will include the most recent advances in HVAC&R system design, equipment, and construction techniques. Programs included will focus on efficiency, responsible use of resources and energy recovery.

- **Track 7: The Great Debate**

Track Chair: Chuck Curlin

Email: ccurlin@shultzeg.com

Engineers commonly weigh multiple solutions to find the best match for a certain project. Centralized or Decentralized heating and cooling? Chemical or non-chemical water treatment? These sessions and papers will present divergent methods for accomplishing the same task. Hear all sides of the debate and decide for yourself.

- **Track 8: Modern Residential Systems**

Track Chair: Rocky Alazazi

Email: mrалazazi@yahoo.com

Engineering for residential HVAC and plumbing systems and equipment used to be referred to as catalog engineering: for a two bedroom house choose one from Column A; for a three bedroom house choose one from Column B. Recent years have seen a boom in energy efficient solutions for the savvy, fiscally-conscience home owner. From glazing to water heating to lighting, this track will provide you with the latest advances for the residential market.

Saint Louis 2016 (June 25 – 29, 2016)

Deadlines:

September 14, 2015 – Conference Abstracts Due

September 14, 2015 – Technical Papers Due

January 4, 2016 – Conference Papers Due

February 8, 2016 – Seminar, Forum, and Workshop Proposals Due

- **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

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.

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Publications subcommittee meeting minutes:

06/29/2015, Atlanta, GA.

Steve Wise (stevewise@att.net)

Attendees:

Joe Bridger	Curt Eichelberger	Andrew Mitchell
Dan LaForgia	Robert Hassler	Kim Osborne
Dustin Meredith	David Herrin	Michelle Patrick
Erik Miller-Klein	Pat Marks	Karl Peterman
Ken Roy	Parag Mathoria	Kangping Ruan
Jason Swan	Andrew Mitchell	Mike Schwob

Voting Members in Red

Fundamentals Handbook, 2017 revision

Eric Sturm confirmed that he had no further suggested changes other than a typo and one format item. Therefore, we are ready for a TC vote to accept it "as is"; however, based on the visit from Sheila Hayter we were advised that ASHRAE will not be doing anything with it before March 22, 2016.....so, let's defer the vote till Orlando 2016 just in case somebody has new ideas.

Applications Handbook, ON-LINE VERSION REFORMAT

- A. A desirable on-line format will probably have a different view-screen aspect ratio than the portrait/letter/2-column configuration of the print version. Also we would want to embed audio files, spreadsheets, etc. and have click-by-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 Orlando2016, a volunteer group (*Steve Wise, Reggie Keith, Jack Wang, Mike Schwob*) will take a stab at it to present to the TC.

Other pubs -

1. Website – Mike Schwob confirmed that presos from past conferences will be updated. We decided to add a link to "Official By-Laws" for TCs.
2. Algorithms – Greg Miller did not attend, so we did not get a report on his first look at the 20-year old publication that ASRHAE sells. In order to determine: * accuracy of equations, * possible additions/removals, *format, etc. he plans to craft a survey that would allow the TC to comment and get that started in Orlando2016.

3. [Practical Guide to Noise and Vibration Control for HVAC Systems, Second Edition](#) - ASHRAE had asked if we want to do an update for this. Consensus is that it was rev'd in 2011 and still is fine.

4. [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 Orlando2016. Volunteers so far are tabulated on the next page:

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			<u>Manufacturer</u>	<u>Consultant</u>
Chapter 1,2,3 —Intro/Basics			Jeremy Stockmans	Steve Wise
Chapter 4—Fan Noise Characteristics Tutorial			Dustin Meredith	Erik Miller-Klein
Chapter 5—Central-Station Air-Handling Units			Curt Eichelberger / Dustin Meredith	Chris Papadimos
Chapter 6—Commercial Packaged HVAC Equipment			Curt Eichelberger / Eric Sturm / Jeremy Stockmans	Chris Papadimos
Chapter 7—Silencers for HVAC Systems			Dan LaForgia / Andrew Mitchell	Jerry Lilly
Chapter 8—Roof Ventilators			Rad Ganesh / Pat Chinoda	John Murphy
Chapter 9—Panel-Type Propeller Exhaust Fans			Rad Ganesh / Pat Chinoda / Jack Wang	John Murphy
Chapter 10—Grilles, Registers, and Diffusers			Randy Zimmerman	Joe Bridger
Chapter 11—Air Terminals			Randy Zimmerman	Chris Papadimos
Chapter 12—Room Fan Coil Units			Randy Zimmerman	Chris Papadimos
Chapter 13—Centrifugal Water Pumps			?	John Dunlap / Jerry Lilly
Chapter 14—Air-Cooled Chillers / CondensERS			Pat Marks / Jack Wang	Jerry Lilly
Chapter 15—Water-Cooled Chillers			Pat Marks / Jack Wang	Jerry Lilly
Chapter 16—Cooling Towers			Erik Miller-Klein	SPX ?
Other New Topics?				
	NEEDS AN INDEX !			
	Chilled Beams		Karl Peterman	
	Generators			
	Transformers			
	VRF / Split Systems			

**Sound Criteria subcommittee meeting minutes:
Meeting Minutes - Atlanta
June 29, 2015 (11 AM-12 PM)**

Attendees:

Andrew Mitchell	Curt Eichelberger
Michelle Patrick	Mike Schwob
Pat Marks	Dustin Meredith
Dan Laforgia	Parag Mathuria
Lauren Ronsse	Jack Wang
Steve Wise	Peter Luttk
Erik Miller-Klein	Kim Osborn
Kenneth Roy	Joe Bridger
Jason Swan	

I. With the work statement up for vote on RTAR 1707 Annoyance Thresholds of Tones in Noise as Related to Building Services Equipment, discussions centered on possible future activity related to Criteria.

A. Additional space criteria, evidence based metrics

1. J. Lilly had expressed interest in Chicago for 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.

2. Idea of integrating more "evidence based" +/- tolerances for space criteria was discussed. The handbook suggests that number ratings for criteria typically represent a +/-5 dB range for design targets. Evidence based tolerances might expand to consider what are noticeable differences around targets. The 3 dB type metric for "just noticeable" difference was referenced. The general discussion would be to look at "least noticeable difference" in level and potentially integrate this for use with criteria for spaces.

3. Review internal/external noise intrusions with respect to space criteria. The handbook references rooms with noise intrusion from traffic and aircraft flyover noise, but does not associate this with the type of space. Potential research could better define noise intrusion with respect to space type.

B. Design versus diagnostic versus commissioning rating methods. Clarify distinctions between rating methods in the ASHRAE Applications Handbook, Chapter 48 (NC, RC, RNC, NCB, RC Mark II, etc.). Edits to the section in and around Table 4, Comparison of Sound Rating Methods.

C. Fluctuations. Possible activity as a next step to expand on work on tones. Objective would be to develop a metric for Criteria section of the Handbook. Criteria subcommittee decided to work on tone criteria first.

1. What are fluctuations?

- a. Surge (ANSI S12.2). A sizeable or clearly perceptible fluctuation in low-frequency sound and mostly produced by airflow in building mechanical systems (to 63Hz) (ANSI S12.2)
 - b. Large random fluctuations (ANSI S12.2). Lmax – Leq and L10 – Leq (to 125Hz)
 - c. Intermittent operation
 - d. Modulation. Beating of multiple, similar frequency tones
12. Possibility of inviting a guest speaker for a hot topic section, or, a web meeting, to talk about sound quality metrics. Discussed potential for evaluating sound quality in buildings in a way that might resemble evaluation of sound quality for consumer products.

Vibration Isolation subcommittee meeting minutes:

Time: Sunday 6/28 8:30-9:30 AM

Place: Room 303 Floor 3 Hilton Atlanta

1. Improvement ideas/suggestions on ASHRAE application handbook chapter 48 – 45 minutes

- Steve Wise and Reggie Keith suggested, in Chicago meeting, improving handbook vibration isolation selection by categorizing source equipment types and guidelines rather than current table format. Steve and Reggie were not present at this meeting. Steve did discuss this during Publication meeting.
- Providing isolator selection examples by equipment type, such as screw chillers.
- Matt Hooti suggestion: Mentioning the effect of VFD and variable speed equipment.
- Paul Meisel comment: For cooling tower applications, some people encountered problems with spring isolators, which were shorted during winter in cold climate when the water was drained out. The water may weigh as much as the cooling tower. This is due to the small clearance of spring deflection, typically about 0.25”, due to installed seismic/wind constraint. Using air spring, while more expensive, would avoid this problem because of self-leveling capability. This would be good to be added as an example.

Action item: Steve, Reggie, and Jack to work out a couple of examples to present to the committee in Orlando meeting.

2. Update on WS1754 – 15 minutes

RTAR1754 was conditionally approved, using phased approach to monitor the project, to move forward toward “Work Statement” at Chicago meeting on January 2015.

Curt Eichelberger: ASHRAE rule requires submitting WS within two years of RTAR approval.

- Action item: Jack to work with Jerry Lily, and Angela Waters (Kinetic Noise) on the first draft; So we have perspectives from HVAC equipment manufacturers, acoustical consultants, and isolator manufacturers.

3. Future meeting topics

After the meeting, Jack and Andrew Mitchell of PCI industries discussed how the silencer manufacturers provide transmission data, which are similar to what we intend to achieve for isolator dynamics data. Jack invited Andrew, who kindly agreed, to present to the committee at Orlando meeting on how the silencer manufacturers measure, and provide transmission loss data in frequency domain.

Action item: Jack to follow up with Andrew on presenting at Orlando meeting.

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