

ASHRAE TC 2.6 Sound and Vibration Control

Main Committee Meeting Minutes

3:15 PM – 5:15 PM EDT Tuesday June 15, 2021

Annual Virtual Conference

NOTE: All Task Group Chairs and Subcommittee Chairs are asked to submit written report to the Secretary (Paul Bauch) before Friday June 18th, 2021

1. Call to order (Saenz-Acosta)

- 1.1. Read scope of TC 2.6: 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.
- 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 (Saenz-Acosta)

- 2.1. Welcome new members and visitors

3. Confirmation of current voting members

- 3.1. 11 members, 8 members present

4. Review and approval of the minutes (Saenz-Acosta)

- 4.1. Curt (1st), Steve (2nd), 8-0-0

5. Secretary's report (Bauch)

6. TC Chair's meeting report (Saenz-Acosta)

- 6.1. New online Roster changes, if you are not a member of TC 2.6 please go to our website: <https://tc0206.ashraetcs.org/membership.php>
- 6.2. New members were asked to join at the ASHRAE TC 2.6 website.

7. ASHRAE Liaison

- 7.1. Section Head
- 7.2. Research
- 7.3. Publications

8. Chair's announcements and correspondence (Saenz-Acosta)

- 8.1. 2021-2022 Chair, Karina Saenz-Acosta
- 8.2. 2021-2022 Vice Chair, Jeremy Stockman
- 8.3. 2021-2022 Secretary, Paul Bauch

9. Subcommittee reports (written reports to be provided to Secretary)

- 9.1. **Research Subcommittee** (Meeuwsen)
 - 9.1.1. Research Chair's meeting report
 - 9.1.2. Work Statements/RTAR's/URP's
 - 9.1.2.1. RP 1707 - Annoyance Thresholds of Tones in Noise as Related to Building Services Equipment
 - 9.1.2.2. RP 1852 - Develop performance metric, criteria, and process to measure and predict of speech privacy in High Performance Buildings
 - 9.1.2.3. WS 1919 - The Effects of Duct Size and Aspect Ratio on Flow Noise in Elbows
 - 9.1.2.4. PTAR – Update Application of Manufacturer's Sound Data book
 - 9.1.3. Topics for future research
- 9.2. **Programs Subcommittee** (Swan)

- 9.2.1. Program Chair's meeting report
- 9.2.2. Programs this meeting
 - 9.2.2.1. Seminar 65: *Sound and Vibration Issues with Mission Critical Facilities*
On Demand from Noon EDT, 28 June 2021
 - 1. Data Center Sound and Vibration Control Issues
Paul Bauch
 - 2. Generator Noise Control
Dan LaForgia
 - 3. Noise Control for Care/Safety in Health Care
Erik Miller-Klein
- 9.2.3. Programs at Las Vegas 2022

9.3. Publications Subcommittee (Wise)

- 9.3.1. Handbook chapters
 - 9.3.1.1. Handbook Fundamentals 2021 (Wise)
 - 9.3.1.2. Handbook Applications 2023 (Wise)
- 9.3.2. Other publications

9.4. Web page (Saenz-Acosta)

9.5. Standards Subcommittee (Bridger)

- 9.5.1. Updates from Other Standards Organizations
 - 9.5.1.1. AHRI (Marks)
 - 9.5.1.2. AMCA (Brooks)
 - 9.5.1.3. ANSI (Reuter)
 - 9.5.1.4. ASTM E33 (Lilly/Shaffer)
 - 9.5.1.5. ISO (Golden)

9.6. Standing Subcommittees [10 minutes]

- 9.6.1. Vibration Isolation (Miller-Klein)

9.7. Operations Subcommittee (Saenz-Acosta) [15 minutes]

- 9.7.1. Honors and awards
- 9.7.2. Long range planning
- 9.7.3. Membership
 - 9.7.3.1. Rolling off: Matthew Hooti, Gregory Meeuwsen
 - 9.7.3.2. Rolling on: Robert Hassler, Matthew Golden
- 9.7.4. Liaisons (Saenz-Acosta)
 - 9.7.4.1. ASHRAE TC 2.1 Physiology and Human Environment (Eichelberger)
 - 9.7.4.2. ASHRAE TC 2.7 Seismic, Wind and Flood Resistant Design (Waters)
 - 9.7.4.3. ASHRAE TC 5.1 Fan Design and Application (Osborn)
 - 9.7.4.4. ASHRAE TC 5.2 Duct Design (Hassler)
 - 9.7.4.5. ASHRAE TC 5.3 Room Air Distribution (Zimmerman)
 - 9.7.4.6. ASHRAE TC 9.6 Healthcare (Koukounian)
 - 9.7.4.7. ASHRAE TC 9.7 Educational Facilities
 - 9.7.4.8. ASHRAE TC 9.8 Indoor Agriculture
 - 9.7.4.9. ASA (Reuter)
 - 9.7.4.10. VISCMA (Waters)
 - 9.7.4.11. Others: INCE/InterNoise (Golden), NCAC (Bridger), EGSA (Simmons), etc...

10. New business/Old business [5 minutes]

11. Next meeting date and location – Las Vegas, NV January 29 – February 2, 2022

12. Adjournment

Research project status:

RP-1707 - Annoyance Thresholds of Tones in Noise as Related to Building Services Equipment

- Project is complete, Patricia Davies principal investigator
- PMS chaired by Kim Osborne.
- We have reviewed and commented on drafts of the final report and executive summary.
- Not aware that final report has been submitted to ASHRAE.

RP-1852 - Develop performance metric, criteria, and process to measure and predict of speech privacy in High Performance Buildings

- Contract awarded to Soft dB Acoustical Consulting, Roderick Mackenzie principal investigator.
- Work has largely been on hold, due to inability to make measurements in occupied spaces under COVID-19.

RTAR-1919 - The Effects of Duct Size and Aspect Ratio on Flow Noise in Elbows

- The work statement was approved by TC 2.6 and TC 5.1 and submitted to ASHRAE by the deadline.
- On the agenda for RAC June meeting.
- Brandon Cudequest is lead author.

PTAR – Update Application of Manufacturer's Sound Data book – Eichelberger

- This is dead. We have started an internal effort under publications subcommittee.

Minutes

1. Reviewed types of programs,
2. Programs of interest at this meeting:
 - a. **Seminar 65:** *Sound and Vibration Issues with Mission Critical Facilities* ([link](#)) (Track 5)
 - b. **Seminar 10:** *Occupants, Building Operation and Environment During COVID-19* ([link](#))
 - c. **Conf. Paper Session 16:** *Occupant Comfort: Improvements in Modelling/ Evaluation of Thermal/Acoustical Comfort* ([link](#))
 - d. **Hot Topic:** Acoustic Cameras (Mackenzie, Miller-Klein, Golden)
 - e. **Hot Topic:** RP-1707 Tones Analysis Software (Lilly)
3. Based on previous plans and recent Doodle poll, proposed following seminars/workshops/papers for upcoming meetings:
 - a. Abstracts due 2 August 2021
 - i. Las Vegas, January 2022: Tunnel ventilation seminar (Dan Laforgia, chair)
 - ii. Las Vegas, January 2022: Equipment Noise Series: Fans (Jerry Lilly, chair)
 - iii. Toronto, June 2022: Tones research project presentation (PMS/Purdue to progress)
 - b. Abstracts due March 2022 (for Toronto June 2022)
 - i. Equipment Noise Series: Duct Noise Breakout/Silencers (champions: Peterman/Papadimos)
 - ii. Equipment Noise Series: Rooftop Systems (champion: Peterman)
 - iii. Prediction v Lab v Field (champions: Papadimos/Marks)
 - iv. Vibration Table Changes (champions: Meeuwsen, Miller-Klein, Wise, Golden, Wowk)
 - v. Acoustics legal issues (champion: Boldt)
4. Potential Hot Topic ideas for future meetings:
 - a. WELL certification acoustics (Miller-Klein/ Bourdeau)?
 - b. INCE (Golden), Realign acoustic standards?
5. Intention is for poll to be redone yearly in the Spring

TYPES OF PROGRAM SESSIONS

Technical Paper

Submitted directly by author
Papers are more involved, detailing research
Maximum of 30 pages
Double-blind review; commercialism review
Longer timeline for development and approval
Published in Transactions
Once paper reviewed/approved, submit presentation for review ~11 months before conference. (eg, March 2020 for Jan 2021)

Conference Paper/Extended Abstract

Submitted directly by author
Less rigorous than technical papers
May highlight case studies or ongoing research
Maximum of 8 pages (3 pages for EAs)
Single blind review; commercialism review
Shorter timeline for development and approval
Abstract due just after conference year before,
Approval/rejection within 1 month,
Full paper due in 6 months,
Present 1 year from current conference.

ASHRAE asks for reviewers periodically

Seminar/Workshop/Forum

Session chairs and speakers selected by TCs
Program submitted by session chair/speakers
Include bios, abstracts, learning objectives, example questions/answers
Speakers submit final presentations 1 month prior to meeting for commercialism review

Seminar

60 minutes: 1 – 3 presentations
90 minutes: 3 – 4 presentations

Workshop

One chair and two presenters (maximum)
30 minutes for presentations
30 minutes for discussion

Debates

Experts (team/individual) present 2 sides
Hot button issues

Forum/Panel

One moderator
60-minute length
No presentations
Not recorded, 'off the record'

Hot Topic

Internal subcommittee presentation
Can be invited from outside TC 2.6
Listed in the ASHRAE schedule
Available to both TC 2.6 and larger organization
Speakers can be video-conferenced (ie, no registration fee)

**** ASHRAE encourages use of their approved PowerPoint template for presentations; available on their website ****

THIS MEETING:
“Phoenix” Virtual, 26-30 June 2021

Tracks:

- 1: Fundamentals and Applications
- 2: HVAC&R Systems and Equipment
- 3: Research Summit
- 4: Professional Development
- 5: Critical Environments: Design/Control/Operation
- 6: HVAC&R for Indoor Plants & Animals
- 7: Future Proof: Renewable/Regenerative/Resilient
- 8: Hot, Hot, Hot (warmer climates)

Seminars/Paper Sessions:

Seminar 65: *Sound and Vibration Issues with Mission Critical Facilities* ([link](#)) (Track 5)

On Demand from Noon EDT, 28 June 2021

1. Data Center Sound/Vibration Control Issues
Paul Bauch, Johnson Controls
2. Generator Noise Control
Dan LaForgia, Vibro-Acoustics
3. Noise Control for Care/Safety in Health Care
Erik Miller-Klein, Tenor Engineering Group

Seminar 10 (not TC 2.6) *Occupants, Building Operation and Environment During COVID-19*

Live Tuesday 29 June from 12:00 PM EDT

1. Impact of Noise on Occupants in Multi-Unit Residences during COVID-19 ([link](#))

Conf. Paper Session 16 (not TC 2.6) *Occupant Comfort: Improvements in Modelling/ Evaluation of Thermal/Acoustical Comfort*

Live Wednesday 30 June from 4:30 PM EDT

2. Acoustic Impact on Work/Study Spaces
Caused by Multi-Functional Use of an Educational Bldg Atrium (VC-21A-C065) 4:50 PM – 5:10 PM EDT ([link](#))

Hot Topics (1-2 PM today):

Acoustic Cameras (Mackenzie, Miller-Klein, Golden)

RP-1707 Tones Analysis Software (Lilly)

NEXT MEETING:
Las Vegas, 29 Jan – 2 Feb 2022

Tracks:

- 1: HVAC&R Systems and Equipment
- 2: Fundamentals and Applications
- 3: Refrigerants/Refrigeration
- 4: Buildings in 360°
- 5: Energy System Integration
- 6: Environmental Health/IEQ, International Arena
- 7: Industrial/Commercial HVAC: Challenges
- 8: Refrigerants, Safety, Performances

Seminars/ Workshops/Forums:

Proposals due: Monday 2 August 2021

Accept/reject notifications: Monday 23 August 2021

Track 7: Tunnel/Underground/Garage ventilation (LaForgia) with TC 5.1

Track 1: Fan Selection for Acoustics (Lilly) (Paul/Curt; Mark Fly?) w/TC 5.1 (Osborne?)

Choose right fan type, configuration, connections

Choose right size

Optimization vs Efficiency

Case Studies

Polled 1st

Technical/Conference Papers:

Conference Paper abstract accept/reject: 30 April 2021

Conference Papers due: 13 July 2021

Hot topics:

WELL certification acoustics (Miller-Klein/ Bourdeau)?

FOLLOWING MEETINGS:
Toronto, 25-30 June 2022

Tracks:

1: [not yet known]

Seminars/ Workshops/Forums:

Proposals due: February 2022

Track 2: Duct Noise Breakout/Silencers (Lilly/ Peterman/Papadimos) **Polled 2nd**; new ASTM breakout measurement standard

Track X: Rooftop Systems (Peterman)
Tied for 4th, 14 votes

Track X: Prediction v Lab v Field (Papadimos/ Marks): **Polled 6th, 12 votes (or 1st, 18 votes)**

Track X: Acoustics legal issues QA. How consultants help. Attorney? (Boldt: Lilly)

Track X: Workshop: Vibration Table Changes (Meeuwssen/Miller-Klein/Wise/Golden/Wowk)

Technical/Conference Papers:

Abstracts/Session requests due: August 2021 [est]

Final Papers due: November 2021 [estimated]

TP: Tones and Background Noise (RP-1707)

Hot topics:

INCE (Golden), Realign acoustic standards?

Atlanta, 4-8 February 2023

Tampa, 24-28 June 2023

TOPICS FOR FUTURE PROGRAMS

Series: Equipment Noise

- 17 Fan Selection for Acoustics (Schaffer)
- 15 Duct Breakout Noise (Lilly/Peterman)
- 15 Silencers: Performance v Design (Papadimos)
- 14 Rooftop systems (Peterman)
- 9 Fan Boxes: above/below floor (Zimmerman)
- 6 Air Distribution Systems (Zimmerman)
- 3 Compressors: Frequency Characteristics ()
- 3 Ductless Systems: PTACs, WSHp (Weinstein)
- 2 Electrical: Xfmrs, Elec Motors (Papadimos)
- 2 Plumbing noise (Wowk) TC 6.1/6.6?
- 2 Small Fan Coils (____)
- 2 Under-floor Air Systems (Reynolds)
- 1 Boilers (Marks)
- 1 DOAS units (Peterman)
- 1 Generators (LaForgia)
- 0 Fume hoods
- 0 Industrial Ventilation (____)
dust collection, garages, LNG
- 0 Pumps (____)
- 0 Refrigeration: Commercial/Transport (Marks)
- 0 Tankless water heaters

Format:

1. What it is, types, how works, why noisy
2. Standards, specification, lab data, mitigation methods
3. Field issues, case studies, testing

Series: Basics of HVAC Noise

- 14 Tones and Fluctuations (Lilly)
- 12 Prediction vs Lab vs Field (Papadimos/Marks)
- 7 Speech Privacy in Low Noise Offices (____)
- 6 Predicted vs Actual Noise (Papadimos)
- 5 Noise Flanking Paths (Peppin)
- 4 How Noise Affects Design Process (Lilkendy)
- 3 Room Msmt: Test Method (Rockwood)
- 2 Commissioning (____)
- 2 Effects of 'over-design' (Lilly)
- 2 Noise and Productivity (Wang)
- 2 Noise Calculations How To (CD?) (Peterman)
- 0 Applications Chapter Review (____)

New Topic Ideas

- X Complying with noise ordinances (Lilly):
misuse of manufacturers' data, multiple noise sources, calculation errors, power v pressure, incomplete data
- X Kitting out your home office for video conferencing (audio/video)

Other Topics:

- 9 Classrooms: ICC adopts S12.60 (Bridger)
- 9 Noise Fluctuations (Lilly)
- 8 Performance Rated Buildings (Roy)
- 5 Passive vs Active (Wise)
- 4 Design of Healthcare Facilities (Miller-Klein)
Alarm fatigue, FGI Guidelines, Privacy
Team up with healthcare TCs?
- 3 Standard Test: Seismic Devices (w/2.7)
- 3 Industrial noise (Keith)
- 3 Noisy kit near to occupied?
- 3 Shell & Core vs Tenant Fit-Out/Improvement
- 2 Tunnel Ventilation (LaForgia)
- 1 Labs internal: Air Valves/Fume Hoods (Wowk)
- 1 Labs external: Stacks, ventilation, nozzles
- 0 Mission Critical Facilities (____)

Past Items:

- 4 Plenum array fans
- 1 *Hearing protection: TWA, Hospitals, Escape / S/N / STI, WHO*
- 0 Refrigerated processes/Storage (Swan offered Keith's talk to TC10.5)

Workshop

- Vibration Handbook Table: Debate on where to take in future? Get feedback

Hot Topics

- How to apply the results of RP-1707 on
Tones? Indoors/Outdoors? To products?

RESULTS of DOODLE POLL (Spring 2021)

34 participants, 208 votes

17 votes

Equipment: Fan Selection for Acoustics (Schaffer)

15 votes

Equipment: Duct Breakout Noise (Lilly/Peterman)

Equipment: Silencers: Performance v Design
(Papadimos)

14 votes

Equipment: Rooftop systems (Peterman)

Basics: Tones and Fluctuations (Lilly)

12 votes

Basics: Prediction vs Lab vs Field
(Papadimos/Marks) **

9 votes

Equipment: Fan Boxes: above/below floor, VAV,
CAV, VFD (Zimmerman)

General: Classrooms: ICC adopts S12.60 (Bridger)

General: Noise Fluctuations (Lilly)

8 votes

General: Performance Rated Buildings (Roy)

7 votes

Basics: Speech Privacy in Low Noise Offices (_)

6 votes

Equipment: Air Distribution Systems (Zimmerman)

Basics: Predicted vs Actual Noise (Papadimos) **

5 votes

General: Passive vs Active (Wise)

Basics: Noise Flanking Paths (Peppin)

4 votes

Equipment: Plenum array fans

General: Healthcare Facilities: Design, Alarm
fatigue, FGI Guidelines, Privacy (Miller-Klein)

Basics: How Noise Affects Design Process
(Lilkendy)

3 votes

Equipment: Compressors: Frequency
Characteristics ()

Equipment: Ductless Systems: PTACs, WSHP
(Weinstein)

General: Industrial noise (Keith)

General: Noisy equipment near to occupied

General: Seismic Devices: Standard Test (w/2.7)

General: Shell & Core vs Tenant Fitout/
Improvement

Basics: Room Measurement: Test Method
(Rockwood)

2 votes

Equipment: Electrical: Transformers, Elec Motors
(Papadimos)

Equipment: Plumbing noise (Wowk) TC 6.1/6.6?

Equipment: Small Fan Coils (_)

Equipment: Under-floor Air Systems (Reynolds)

General: Tunnel Ventilation (LaForgia)

Basics: Commissioning (_)

Basics: Effects of 'over-design' (Lilly)

Basics: Noise and Productivity (Wang)

Basics: Noise Calcs/How To (CD) (Peterman)

1 vote

Equipment: Boilers (Marks)

Equipment: DOAS units (Peterman)

Equipment: Generators (LaForgia)

General: Labs internal: Air Valves/Fume Hoods
(Wouk)

General: Labs external: Stacks, ventilation, nozzles

General: Hearing protection: TWA, Hospitals,
Escape / S/N / STI, WHO

0 votes

Equipment: Fume hoods

Equipment: Industrial Ventilation (_), dust
collection, garages, LNG

Equipment: Pumps (_)

Equipment: Refrigeration: Commercial/Transport
(Marks)

Equipment: Tankless water heaters

General: Mission Critical Facilities (_)

General: Refrigerated processes/Storage (Swan
offered Keith's talk to TC10.5)

Basics: Applications Chapter Review (_)

PAST PROGRAMS

2021 “Chicago”/“Phoenix”

2020 Orlando/“Austin”

Vibration Isolation Advances (Golden, Scarlett, Meeuwsen)

Beware These Common Concerns in Multi-Family Buildings (Miller-Klein, Dong/Rawlins, Golden)

When Is “Quiet” Quiet Enough (Hunt: Marks, Kollevoll)

HT: ANSI S12:60 / FGI vs 189.1 (Miller-Klein)

HT: Speech Privacy (Koukounian)

HT: Pandemic effects on acoustics

2019 Atlanta/Kansas City

RP-1408 Ductwork research (Herrin, Schwob)

VRF Systems (Lilly, Miller-Klein, Wowk)

Noise/Vib Equipment Selection (Boldt, Eichelberger, Wowk)

HT: IBC updates (Schmeida)

HT: Basecamp (Miller-Klein)

Commissioning (Miller-Klein, Swan)

Chilled Beams (Searle, Peterman, M-K)

Blocked Impedance (Meeuwsen)

2018 Chicago/Houston

Impacts of Safeguarding Buildings/HVAC Systems (Miller Klein)

HT: User Manual 189.1 Acoustic Control, Next Steps

HT: LNG Facilities (R Keith)

2017 Las Vegas/Long Beach

Acoustic Performance Standards for Residential Buildings (Miller-Klein)

HT: Mech Equipment Vibration & Structural Interaction (Wowk)

2016 Orlando/St Louis

TP: Simulating Noise Attenuation in Ducts (Kuehn)
Acoustics in Multi-Family Residential Environments (Papadimos)

Avoiding Pitfalls Integrating Seismic and Sound Control (w/2.07)

HT: Algorithms for HVAC Acoustics

2015 Chicago/Atlanta

System Effects from Inlet of Centrifugal/Plenum Fans (w/5.1,5.9)

Acoustic Mitigation for Lightweight Roof Assemblies (Miller-Klein)

Green Building Acoustics (Miller-Klein)

HT: Condensing Units on Lightweight Roof (Lilly)

HT: Sound measurement in rooms (Lilly)

2014 New York/Seattle

Equipment: Hydronic Systems (Miller-Klein)

Basics: Environmental Noise Impact & Mitigation (Wang)

2013 Dallas/Denver

Basics of HVAC Noise Control (Miller-Klein)

Numerical Methods for Noise/Vibration Simulation (Eichelberger)

HT: ASHRAE 189.1

2012 Chicago/San Antonio

Vibration Induced Noise & Mech Equipment Isolation (Marks)

HT: BIM and Acoustics

Impacts of Poor Aerodynamic HVAC Conditions (Schaffer)

New Acoustical Criteria and Measuring Methods (Peterman)

Review of Updated AHRI Standards (Papadimos)

2011 Las Vegas/Montreal

Recent Research: Healthcare Facility Acoustics (Papadimos)

Acoustic Codes/Standards/Guidelines (Muehleisen)

HT: Classroom Physical Environment Effects on Learning (Reynolds)

Fan Array Efficiency/Performance (Raychaudhuri)

Forum: Incorporating Acoustics into BIM (Peterman/Mitchell)

2010 Orlando/Albuquerque

Acoustics in High Performance Building (Peterman)

Noise & Mech System Design Process (Lilkendey)

Multiple Plenum Fans in an Array (Ganesh)

HT: Criteria (Paige) / Lined Duct End Reflection (Lilly)

HT: Int'l GBC (Marks) / Terminal Unit Tests/ASHRAE 130 (Peterman)

Classroom HVAC Noise Control (Lilkendey)

Unique Case Studies (Papadimos)

TP: Effects of Mech System Noise on Human Perf./Perception (Roy)

Sustainability and Our Environment (Ronsse)

2009 Chicago/Louisville

Staff Performance/Patient Welfare in Healthcare Facilities (Wang)

2008 New York/Salt Lake City

TP: End Reflection (RP-1314) (Eichelberger)

TP: Fan System Effects (RP-1219) (Eichelberger)

2007 Dallas/Long Beach

Acoustics for Green Buildings (Roy)

Acoustic vs Seismic (Lama/Marks/Blazier)

Lab Noise Control (Johnson/Moiseev)

ASHRAE TECHNICAL COMMITTEES

1.0-FUNDAMENTALS AND GENERAL

- 1.1 Thermodynamics and Psychrometrics
- 1.2 Instruments and Measurements
- 1.3 Heat Transfer and Fluid Flow
- 1.4 Control Theory and Application
- 1.5 Computer Applications
- 1.6 Terminology
- 1.7 Business, Management & General Legal Education
- 1.8 Mechanical Systems Insulation
- 1.9 Electrical Systems
- 1.10 Electric Motors and Motor Control
- 1.11 Moisture Management in Buildings
- 1.13 Optimization

2.0-ENVIRONMENTAL QUALITY

- 2.1 Physiology and Human Environment
- 2.2 Plant and Animal Environment
- 2.3 Gaseous Air Contaminants and Gas Contaminant Removal Equipment
- 2.4 Particulate Air Contaminants and Particulate Contaminant Removal Equipment
- 2.5 Global Climate Change
- 2.6 Sound and Vibration
- 2.7 Seismic, Wind and Flood Resistant Design
- 2.8 Building Environmental Impacts and Sustainability
- 2.9 Ultraviolet Air and Surface Treatment
- 2.10 Resilience and Security
- TG2 HVAC Security

3.0-MATERIALS AND PROCESSES

- 3.1 Refrigerants and Secondary Coolants
- 3.2 Refrigerant System Chemistry
- 3.3 Refrigerant Contaminant Control
- 3.4 Lubrication
- 3.6 Water Treatment
- 3.8 Refrigerant Containment

4.0-LOAD CALCULATION, ENERGY REQUIREMENTS

- 4.1 Load Calculation Data and Procedures
- 4.2 Climatic Information
- 4.3 Ventilation Requirements and Infiltration

- 4.4 Building Materials and Building Envelope Performance
- 4.5 Fenestration
- 4.7 Energy Calculations
- 4.10 Indoor Environmental Modeling
- TRG4 Indoor Air Quality Procedure Development

5.0-VENTILATION AND AIR DISTRIBUTION

- 5.1 Fans
- 5.2 Duct Design
- 5.3 Room Air Distribution
- 5.4 Industrial Process Air Cleaning (Air Pollution Ctrl)
- 5.5 Air-to-Air Energy Recovery
- 5.6 Control of Fire and Smoke
- 5.7 Evaporative Cooling
- 5.9 Enclosed Vehicular Facilities
- 5.10 Kitchen Ventilation
- 5.11 Humidifying Equipment

6.0-HEATING EQUIPMENT, HEATING AND COOLING SYSTEMS AND APPLICATIONS

- 6.1 Hydronic and Steam Equipment and Systems
- 6.2 District Energy
- 6.3 Central Forced Air Heating and Cooling Systems
- 6.5 Radiant Heating and Cooling
- 6.6 Service Water Heating Systems
- 6.7 Solar and Other Renewable Energies
- 6.8 Geothermal Heat Pump and Energy Recovery Applications
- 6.9 Thermal Storage
- 6.10 Fuels and Combustion

7.0-BUILDING PERFORMANCE

- 7.1 Integrated Building Design
- 7.2 HVAC&R Construction & Design Build Technologies
- 7.3 Operation and Maintenance Management
- 7.4 Exergy Analysis for Sustainable Buildings (EXER)
- 7.5 Smart Building Systems
- 7.6 Building Energy Performance
- 7.7 Testing and Balancing
- 7.8 Owning and Operating Costs
- 7.9 Building Commissioning

8.0-AIR-CONDITIONING AND REFRIGERATION SYSTEM COMPONENTS

- 8.1 Positive Displacement Compressors
- 8.2 Centrifugal Machines
- 8.3 Absorption and Heat Operated Machines
- 8.4 Air-to-Refrigerant Heat Transfer Equipment
- 8.5 Liquid-to-Refrigerant Heat Exchangers
- 8.6 Cooling Towers and Evaporative Condensers
- 8.7 Variable Refrigerant Flow (VRF)
- 8.8 Refrigerant System Controls and Accessories
- 8.9 Residential Refrigerators and Food Freezers
- 8.10 Mechanical Dehumidification Equipment and Heat Pipes
- 8.11 Unitary and Room Air Conditioners & Heat Pumps
- 8.12 Desiccant Dehumidification Equipment and Components

9.0-BUILDING APPLICATIONS

- 9.1 Large Building Air-Conditioning Systems
- 9.2 Industrial Air Conditioning and Ventilation
- 9.3 Transportation Air Conditioning
- 9.4 Justice Facilities
- 9.6 Healthcare Facilities
- 9.7 Educational Facilities
- 9.8 Large Building Air-Conditioning Applications
- 9.9 Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment
- 9.10 Laboratory Systems
- 9.11 Clean Spaces
- 9.12 Tall Buildings

10.0-REFRIGERATION SYSTEMS

- 10.1 Custom Engineered Refrigeration Systems
- 10.2 Automatic Ice-making Plants and Skating Rinks
- 10.3 Refrigerant Piping, Controls and Accessories
- 10.5 Refrigerated Processing and Storage
- 10.6 Transport Refrigeration
- 10.7 Commercial Food and Beverage Refrigeration Equipment
- 10.8 Refrigeration Load Calculations

Email Programs' chair: TCXXxx.PRO@ashrae.net

JOINT BOOKLET TASK FORCE

Update and merge: ***Practical Guide to Noise and Vibration Control*** and ***Application of Manufacturers' Sound Data***

The effort is challenging, not the least of which was reaching consensus on the chapter format. Discussion at today's meeting helped with that. We also reaffirmed the target audience: that is, we aren't wanting to offer a "primer" to make all A/E's acoustic geniuses; but rather, offer support materials and practical design guidelines to those who prescribe noise control treatments and those who produce products rated under appropriate acoustic test standards.

HANDBOOKS

Fundamentals Handbook 2021-

The submittal to ASHRAE for this rev cycle (in May 2020) was somehow overlooked by staff and did not go to print. It is exactly as it was in 2017.

None of the changes were critical, but we would like to perhaps update the on-line version. In the meantime, we have had a few new ideas for additional changes.

We plan to get back on this as soon as we have wrapped up the Applications update in March.

Applications Handbook 2023–

Erik Miller-Klein's working group has not yet reached consensus for changes to the Vibration section. Thus, our edits for the update have focused on the other parts.

Our deadline for the 2023 rev Submittal is March 23 – we are targeting March 3 for a final TC approval vote.