

**ASHRAE TC 9.10 Laboratory Systems  
Virtual (Annual 2021)  
Thursday, June 17, 2021  
Meeting Minutes**

**AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING  
ENGINEERS, INC.  
1791 TULLIE CIRCLE, N.E./ATLANTA, GA 30329  
404-636-8400**

**TC/TG/TRG MINUTES COVER SHEET**

TC/TG/TRG NO	9.10	DATE	January 28, 2021
TC/TG/TRG TITLE	Laboratory Systems		
DATE OF MEETING	June 17, 2021	LOCATION	Virtual

Voting Members Present	Term Expires	Members Absent	Term Expires	Ex-officio members and additional attendance
Guy Perreault (Chair)	2022	Jason Atkisson	2021	Robert Weidner
Brad Cochran	2022	Tom Smith	2021	John Castelveccchi
Christine Reinders-Caron	2023	Patrick Carpenter	2021	Lou Hartman
Kenneth Kuntz	2021	Jacob Edmondson	2022	Jim Coogan
John Varley	2024	Mary Foutz	2023	Roland Charneux
Eric Ballachey	2023	Lloyd Le	2023	Charles Henck
Kishor Khandari	2024	Glenn Friedman	2024	Gordon Sharp
Martin Stangl	2023	Brent Fullerton	2022	Wei Sun
				Rachel Romero
				Charlie Hon
				Danny Sanchez
				George Isherwood
				Ryan Parker
				Matthew Warren
				Kevin Belusa
				Otto VanGeet
				Ryan Soo



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**DISTRIBUTION**

<i>All Members of TC/TG/TRG plus the following:</i>	
TAC Section Head: Vance Payne	
TAC Chair: Dustin Eric Jason Meredith	
All Committee Liaisons As Shown On TC/TG/TRG Rosters:	
Standards Liaison: Rick Heiden	
Manager of Research & Technical Services: Mike Vaughn	
Research liaison: Paolo Tronville	

**Call to order 3:00 PM / Introductions**

Guy reviewed the ASHRAE Cod of Ethics.

Guy gave introduction to TC9.10 and reviewed high level objectives of the committee.

Introduction to TC9.10 website and Basecamp. Jim Coogan is web master. Roles and responsibilities are on the website. Discussion on posting presentations on the website. Concern is ownership and sale of virtual conferences.

Skipped individual introductions because of virtual meeting, participants could see participants list.

Reviewed Current Leadership and Follow-on leadership.

Currently there are 16 voting members – preference is to have mix of manufacturers, owners, consultants, and contractors.

**Quorum is not met 8 of 16 members present.**

**Membership Update (Brad Cochran)**

Current Leadership

Chair – Guy Perreault

Vice-Chair – Robert Weidner

Secretary – John Castelvechi

Rolling off June 30, 2021

- Ken Kuntz
- Jason Atkisson

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- Tom Smith
- Patrick Carpenter

Rolling on July 1, 2021

Wei Sun

Kelley Cramm

Robert Weidner

Ken Crooks

### **Approval of Virtual meeting minutes (Guy Perreault)**

- Minutes from the 2021 Winter Virtual meeting were emailed previously.
- Comments on 2021 Winter Virtual Minutes:
  - None
  - Minutes were not approved at the meeting because of no quorum, will hold until next meeting.

### **Section Head Report (Brad Cochran)**

- No report

### **Program Subcommittee (Christine Reinders-Caron)**

- See sub-committee report attachment.
- 13 attendees
- 1 sponsored live program
- 2 sponsored on demand seminars
- 1 Co-sponsored seminar
- 10 ideas for future programs
- August 2nd is deadline for program seminars for Las Vegas.
- Conference Paper abstracts due July 12th for Las Vegas
- Program template is on basecamp.
- Planning zoom meeting before August deadline.

### **Research Subcommittee (Bob Weidner)**

- See sub-committee report on attachment.
- 18 in Attendance
- RP 1780 – Test Method to develop a Methodology to Evaluate Cross Contamination of Gaseous Contaminants within Total Energy Wheels – Project was awarded to University of Saskatchewan. Deadline now March 1, 2022 due to Covid.
- Work statement 1835 Characterizing the Performance of Entrained Flow Stacks– sending out for rebid.
- Future Research
  - Next steps to RP 1780

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- Surveying of sources of contamination of existing labs.
- Research of Labs in Higher Education – co-sponsor
- Research on 3D printing
- DCV in labs
- Ventilation Effectiveness
- Use of Analytics to better operate Labs.
- RP 1833 on Air Changes ongoing. Final report due in July

**Laboratory Classification (Danny Sanchez)**

- Need to get word out about the Lab Classification Guide.
- Looking to Improve.

**Standard 110 (Wade Conlan)**

- No report – Meeting next Friday

**Laboratory Design Guide (Ken Kuntz)**

- See attached minutes.
- 20 attendees
- Working on Guide a little over 3 years
- Chapters Complete
  - Chapter 3: Design Process
  - Chapter 5: Laboratory Hood Design-may re-open
  - Chapter 11: Controls
  - Chapter 14: Laboratory Commissioning Process
  - Chapter 16: Microbiological and Biomedical Laboratories
- Working on editing the following chapters.
  - Chapter 4: Laboratory Planning
  - Chapter 8: Air Treatment
  - Chapter 9: Exhaust Stack Design
  - Chapter 12: Airflow Patterns and Testing Procedures
  - Chapter 17: CFD Modeling of Laboratory Ventilation
  - Chapter 18: Sustainable Design
  - Chapter 20 (new): Ventilation Effectiveness

**Handbook Subcommittee (Lou Hartman)**

- A year to go, due mid 2022.
- Reviewed chapter updates
- Need to Update
  - Building Analytics
  - Dynamic testing, part of commissioning section

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- Chapter on basecamp, need comments by Winter meeting.

### **Journal (Roland Charneaux)**

- One article in March Journal since Winter meeting

### **ALI Courses (John Varley)**

- Lab Design – Have not received invitation from ALI for Las Vegas. Looking for someone to give the class – reach out to John Varley
- Lab Controls – About 95% complete, need to get paperwork to ASHRAE. Need to add equipment and safety monitoring at front end.

### **Liaison Reports**

- TC 1.4 Control Theory & Applications (Jim Coogan)
  - Seminar for Toronto for sequences for labs.
- TC 2.2 Plant and Animal Environment (Henry Hays)
  - Not Report
- TC 4.3 Ventilation and Infiltration (Martin Stangl)
  - On demand seminar 34 on wind modeling
- TC 5.1 Fans Systems (Ken Kuntz)
  - No Report
- TC 5.3 Room Air Distribution (Kishor Khankari)
  - Air contamination and white paper
- TC 7.6 Building Energy Performance (Pat Carpenter)
  - No Report
- TC 7.9 Commissioning (Wade Conlan)
  - No Report
- TC 9.2 Industrial Air Conditioning (Eric Ballachey)
  - No Report
- TC 9.6 Healthcare (Traci Henegan)
  - Nothing specific to labs
- Update on Epidemic Task Force (Traci Henegan)
  - Updated core recommendations
  - One page Guidance Documents
  - Dental Facilities
  - Equivalent OA Calculator (adding filtration and UV)
- TC 9.7 Educational Facilities (Keith Hammelman)
  - No Report
- TC 9.11 Clean Spaces (Roland Charneux)
  - RP 1604 Variable flow for Cleanrooms should be completed by end of year.

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- MTG ACR (Jim Coogan)
  - No Report
- Standard 62.1 Ventilation for IAQ (Brendon Burley)
  - No Report
- 90.1 Energy Efficiency (Jason Atkisson)
  - No Report
- SMACNA
  - No Report
- NFPA 45 (Ken Crooks)
  - No Report
- NSF
  - No Report
- ISPE
  - No Report
- AIHA/ASSP Z9.5 (Jim Coogan)
  - Public review starts 6/18/21 6-week period.
  - ASSP.org need to email person in charge of standards to participate in the review. Must buy standard to participate in review.
  - Major Updates
    - Ventilation effectiveness must be addressed during design.
    - Hood testing aligned with Std 110.
    - DCV section updated.
    - Risk Assessment and Lab ventilation plan updated.
- I2SL (Gordon Sharp)
  - In person conference Sept 26-29 in Atlanta, registration is open.
  - User manual for labs in development.
  - Lab benchmarking tool in development.
  - Effort to revitalize best practice guide.

**Old business**

- None Reported

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**New business**

- Congratulate John Varley on nomination to Fellow.
- January 29 to February 2, 2022 – Next meeting in Las Vegas.

**Main Meeting adjourned at 4:03 pm.**

**ASHRAE TC 9.10 Laboratory Systems Virtual  
Program Sub Committee  
Thursday January 27, 2021 11:00AM EDT  
Meeting Minutes**

**Program Sub Committee Meeting, Virtual Meeting June 2021**

**Attendees: - Please type your name and e-mail in the chat to log in**

Christine Reinders

Robert Weidner

Kevin Belusa

Guy Perreault

Matthew Warren

Kurt Rindoks

Ken Kuntz

John Castelvechi

Kishor Khankari

Rachel Romero

Roland Charneaux

Jim Coogan

Wilburn Larson

**Virtual Programs**

**Sponsored Programs**

**Seminar 18:** Update on the ANSI Z9.5 Laboratory Ventilation Standard

**Chair:** Jim Coogan

*Wednesday 6/30 11:30-1:30pm*

**Seminar 45:** Fume Hood Testing and the State of the Industry

**Chair:** Robert Weidner

*On Demand*

**Seminar 68:** Strategies to Optimize Critical Exhaust Systems

**Chair:** Jim Coogan

*On Demand*

**Co-Sponsored Programs**

**Seminar 9:** Is More Better? Air Change Rate for Health Hazard Control in Critical Environments

**Chair:** James Bennett

*Tuesday 6/29 12-2pm*

**Future ASHRAE Conferences**

January 31- Feb. 2, 2022 – Las Vegas, NV – Technical Chair - Raul Simonetti

June 25-29, 2022 – Toronto, ON - Technical Chair – Kristen Cetin

**Potential Sessions – Need new faces 😊**

Rachel & Guy– Smart Labs – Ventilation Risk assessment tool &

Classification Documents – Update

Classification Application & Use

Rachel (Chair) & 2<sup>nd</sup> NREL (Amanda-speaker)

Add 3<sup>rd</sup> or 4<sup>th</sup> (Jim Coogan) Demand Control Ventilation

Sensors - Z9.5 member potential speaker

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Bob Weidner - Labs after COVID-19

Bob Weidner - Sustainable Laboratories

Kishor – ACH Cosponsor

Challenges in Lab Ventilation (Owners Perspective) Operation & Maintenance

Owner 1

Owner 2

Owner 3

(Toronto) Roland – RP 1780 – Cross Contamination with Energy Wheels

(Toronto) Jim – Control Sequences related to Guideline 36

**Speaker Resources**

<https://www.ashrae.org/conferences/speaker-resources>

[https://www.ashrae.org//File%20Library/Conferences/Speaker%20Resources/SpeakersManual\\_0718.pdf](https://www.ashrae.org//File%20Library/Conferences/Speaker%20Resources/SpeakersManual_0718.pdf)

**Las Vegas Deadlines:**

~~**Monday, April 12, 2021:** Conference Paper Abstracts, Technical Papers Due~~

~~**Friday, April 30, 2021:** Conference Paper Abstract Accept/Reject Notifications~~

**Friday, June 18, 2021:** Website Opens for Program Proposals

**Monday, July 12, 2021:** Conference Papers Due

**Monday, August 2, 2021:** Debate, Panel, Seminar, Forum, Workshop and Debate Proposals Due

**Friday, August 6, 2021:** Revised Conference Papers/Final Technical Papers Due

**Monday, August 23, 2021:** Conference Paper Accept/Revise/Reject Notifications

**Las Vegas Tracks & Track Chairs**

1. **Fundamentals and Applications:** Bob Cox
2. **HVAC&R Systems & Equipment:** Anoop Peediyakkan
3. **Refrigerants & Refrigeration:** Billy Austin
4. **Buildings at 360:** Nohad Boudani
5. **Energy System Integration:** Scott Peach
6. **Environmental Health and IEQ in the International Arena:** Som Shrestha
7. **HVAC for the Industrial and Commercial Purposes – Challenges & Opportunities:** Bert Phillips
8. **Refrigerants, Safety, Performances:** Gary Debes

**Toronto Tracks & Track Chairs**

1. **Fundamentals and Applications:** Eric Sanchez
2. **HVAC&R Systems and Equipment:** Marites Calad
3. **Research Summit:** Brian Fronk
4. **Connected Buildings, Connected Communities:** Ahmed Abdel Salam
5. **Cold Climate Building System Design, Operation, and Resilience:** Davide Ziviani
6. **IAQ Energy Use, Comfort, and Health of Sustainable Buildings:** Rafi Karim
7. **Professional Development and Education:** Maggie Moninski
8. **Buildings in the Aftermath of COVID-19:** Andy Cochrane

## **ASHRAE 9.10 Research Subcommittee Meeting Agenda & Current Work Status**

***June 16, 2021 (revised 6/17/21) – 15 Attendees***

### **Research Projects:**

#### ***RP 1573 – SF6 Replacement Gas Project Status (Tom Smith – 3Flo)***

1. Research Project was completed in April 2020 and TC 9.10 approved via electronic vote.
2. Plan to include research findings in Seminar at Summer Meeting (Phoenix)
3. Tom is working with ASHRAE 110 committee to build upon the research for developing a round robin testing program.
4. ***Conclusion/Path Forward: Method proposed is good methodology; working on testing setups that are cost effective and repeatability.***
5. ***Report available on Technology Portal – re: 1573; Login separately to portal***

#### ***RP 1780 (Test Method to develop a Methodology to Evaluate Cross Contamination of Gaseous Contaminants within Total Energy Recovery Wheels) – Roland C.***

1. Project RP 1780 was awarded to University of Saskatchewan.
2. The PMS includes: Bob W. (Chair), Roland C. (WS Author), Nick Agopian, Brendon Burley, Hoy Bohannon
3. We have had seven meetings with U of S but due to the loss of a researcher, issues with Covid-19 pandemic and getting a new researcher the project schedule has been extended to March 1, 2022. To date the work has included the following:
  - a. Literature Review – Near complete; PMS asked for test condition parameters on literature research to compare to with the 1780 research.
  - b. Test Facility Operational (except for gas analyzer) Initial Tests are now on-going.
4. U of S Project Update following this meeting starting @ 1:30PM

### **Work Statements:**

#### ***WS 1835 (Characterizing the Performance of Entrained Flow Stacks) – Brad C. (CPP)***

1. On Hold - ASHRAE decided not to bid any TRPs Fall 2021. Another nine conditionally approved TRPs that may be ready in time to bid or re-bid this spring, but those projects bid in the spring would impact the SY 21-22 budget, which we anticipate might be even smaller than this SY budget due to the loss of the AHR Expo in Chicago. As a result, we plan to not release any additional projects for bid until possibly SY 21-22 or later.
2. **Did receive a couple bids; more detail to be provided into work statement for rebid.**
3. **Submitted an updated statement in August 2020...waiting for \$\$\$ to go out to bid.**

### **Research in progress, initiated or under consideration:**

1. RTAR to “Survey of sources of contamination in existing labs” Roland C. and Tom Smith (**on hold**). No change but more info available.
2. RP 1833 on Air Change Rates: MTG committee encompassing several TC’s looking into the why’s and where’s of Air Change Rates – Literature research on-going as first phase. *PI – AEI – Roger Lautz – (Clemson); Final report due in July and expected to present at Winter Meeting.*

3. 9.7 Higher Education – working on RTAR looking for TC9.10 to Co-sponsor specifically research for “Labs being used in higher education”. *Kishor can help with the RTAR. Keith Hammelman is the liaison and will look into this! RHW follow up with Keith*
4. 1573 Follow-up Research Project to address additional scope not addressed in SF-6 Replacement Study (Bob Weidner and Tom Smith to develop RTAR post SF6 Research). *New generator required so waiting to see if RTAR is needed. RHW to follow up with Tom Smith.*
5. 3D Printing, Laser Issues – emerging issues brief, parallel studies on-going at AIH. Kishor involved. 62, 9.10, Industrial Ventilation; Environmental Health. *No ownership of this to date; Would 9.7 be interested in taking on. Health consequences unknown. (nano particles and chemicals). Industrial Ventilation 30<sup>th</sup> Edition does not address 3D printing and laser printing. Elliott Horner – UL colleagues did presentations. There is a UL test standard, 2904, for assessing particle and chemical emissions. UL teamed with Georgia Inst. of Tech for a 2-year study. Willing to help: Kishor and Wei Sun (Environmental Health Committee Lead) No update!*
6. Demand Control Ventilation in labs to reduce air flow rates; how is this verified? Sensors installed improperly, never properly tested or maintained. *Tom Smith AHIA Z 9.5 will include modulation and response to occupancy with other sensing (CO2, particles, chemical, etc.) Test Methodology not available at this time. Mechanism of challenge. TC 9.11 has a RP on-going that may help. Sensor location is important based on room airflow conditions (or duct averaging). Ventilation effectiveness. Sensor response. Kishor, Bob to assist. Kishor to pull 9.11 WS; Willing to help: Gordon Sharp, Wei Sun (9.11 RP Lead – 3D and Tracer Gas studies); Kishor would be key to this moving forward. No update! Test Procedure would be useful! 9.11 Project was a success and Wei Sun is interested in doing one for labs.*
7. Ventilation effectiveness – I2SL research on-going; Potential collaboration; Multiple research projects needed. *What is VE for Labs? Define VE and assessment. Kishor to initiate thought process. Bob, Tom; Need volunteers – 5.3 Air Distribution; 9.7 Healthcare; Price Manufacturing representative; Guiding principles for good ventilation. Focus on labs. No update! Test Procedure would be useful! Ventilation Effectiveness Outcomes and Validation.*
8. *Using Analytics and to integrate to help better operate buildings. Need a lead! How much is it being used in HVAC market and lab market? Used more significantly in Industrial. What is the research angle to be addressed? Jim Coogan to follow up with his staff. Check with Cx Group – TC 7.9.; NREL (Rachel); I2SL has Best Practice Guide on this subject; U of Cal, Irvine has done research; Smart Labs – (Tom Smith to provide insight as to what should be researched).*

**TC 9.10 Laboratory Systems****Design Guide Subcommittee Meeting, Wednesday June 16<sup>th</sup>, 3:45 – 5:15pm Eastern Time****Meeting Notes****Attendees:**

Guy Perreault	Jim Coogan	Kurt Rindoks	Robert Weidner	Wilburn Larson
Wei Sun	Chris Kirchner	Mathew Warren	Rachel Romero	
John Castelvechi	Wilburn Larson	Danny Sanchez	Kevin Belusa	
Brad Cochran	Otto VanGeet	Darryl DeAngelis	Ryan Soo	
Roland Charneux	Chris Kirchner	Amanda Kirkeby	Ryan Parker	

-Review goal of sub-committee

*Complete revision 3 of the Design Guide*

*Edit and revise a few chapters at a time until complete*

*Add content as necessary*

-Reminder of Design Guide Process and Basecamp

- *Location: TC 9.10 basecamp, Docs & Files, Subcommittees, Design Guide*
- *Current unedited chapter versions are in "Version 2"*  
*If you don't see it, it's being edited, look in version 3*
- *Latest edited versions are in "Version 3"*  
*Chapter leads will post current chapter edits (Version 3)*  
*Note color codes;      Red-currently being edited*  
*Yellow – Edits complete and under review*  
*Green- Edits completed*
- *Deadlines – After the chapter lead has agreement from the team on edits, they will post the chapter in the Version 3 folder and "turn the color yellow for under review" and announce to the TC at the following meeting that it is ready for review. If no items are brought up by the meeting after that, the chapter will be completed and turned green.*
- *Chapter leads or SC chair will post the final chapter edits to the ASHRAE Authoring Portal*
- *SC chair will post Agenda and notes from meetings on Basecamp site*

-High Level Review action items since last meeting

*Chapter 5 laboratory hood design:*

*Additional edit added-turned green*

*Chapter 11 controls:*

*Final edit added-turned green*

*Chapter 14 Laboratory Commissioning Process*

*No further edits added – turned green*

*Chapter 12 Airflow Patterns and Testing Procedures*

*Edits continue – remains red*

*Chapter 16 Microbiological and Biomedical Laboratories*  
*No further edits added – turned yellow, ok for green?*

*Chapter 18 Sustainable Design*  
*New edits complete and posted to basecamp*

*Chapter 19 Exposure Control Devices*  
*Removed chapter and content added to Chapter 5*

-Reminder to obtain permission or image utilization in guide

### **New Business – Chapter Report-Outs (5-10 min each)**

Chapter Lead Report Outs / Group Discussion: (List of chapter leads & team at bottom of agenda)

- Chapter 4: Laboratory Planning, ~~Jessica Mangler~~, [Books Stout](#), [Ken to contact](#)
- Chapter 8: Air Treatment, Bob Weidner-[adding electronic air cleaning](#)
- Chapter 9: Exhaust Stack Design, Brad Cochran-[in conjunction with other documentation edits by Jan](#)
- Chapter 12 Airflow Patterns and Testing Procedures, Wei Sun – [significant edits under review](#)
- Chapter 14: Laboratory Commissioning, Daniel Frasier -[complete](#)
- Chapter 16: Microbiological and Biomedical Laboratories, Daniel Frasier-[No edits, turn green](#)
- Chapter 17: CFD Modeling of Laboratory Ventilation, Kishor Khankari
- Chapter 18: Sustainable Design, Rachel Romero, Roland Charneux – [new images, checklist, updated links](#)
- Chapter 20 (new): Ventilation Effectiveness, Kishor Khankari -[May put in chapter 17 if not enough content](#)

-Additional chapters or Smart Guide content for editing?

*Ideas for additional content (running list):*

- O&M chapter harmonized with other ASHRAE publications
  - How design guide applies to Z9.5 and where it applies – adding to chapter 9
  - Additional Chapter: Lab Classification-How to use, free download (add to smart guide)
  - How to specify a lab – incorporate into chapters 3 & 4
  - Air Cleaners – adding to chapter 8
  - How to develop the basis of design
- Additional topics for the design guide or comments?

### **Chapter Team List**

Item shaded in gray are “complete”

Chapter	Title	Chapter Lead	Edit/Review Team
<b>1</b>	<b>Introduction</b>	Bob Weidner	
<b>2</b>	<b>Background</b>	Bob Weidner	
<b>3</b>	<b>Design Process</b>	Chris Kirchner	John Castelvechi, Wade Conlan, Doug Ross
<b>4</b>	<b>Laboratory Planning</b>	<a href="#">Brooks Stout</a>	Brooks Stout, Harris Sheinman, <a href="#">Danny Sanchez</a>

5	Exhaust Hoods	Kurt Rindoks	Larry Meisenzhal, John Castelvechi, Brooks Stout, Ken Kuntz, Tom Smith
6	Primary Air Systems		Bob Weidner, Brendon Burley, Charles Murphy, Wei Sun
7	Process Cooling		Brooks Stout, Charles Murphy
8	Air Treatment	Bob Weidner	Rami Alkahlil, Charles Murphy
9	Exhaust Stack Design	Brad Cochran	Ken Kuntz, Glenn Friedman, Martin Stangl
10	Energy Recovery		Bob Weidner, Brendon Burley, Chris Kirchner, Glenn Friedman, Charles Murphy
11	Controls	John Castelvechi	Guy Perrault, John Garrett Neubauer, Brendon Burley, Brad Cochran, Doug Ross, Ken Kuntz, Jim Coogan, Wei Sun
12	Airflow Patterns and Testing Procedures	Wei Sun	Tom Smith, Salil Sansare, Dan Fraiser, <a href="#">Jim Coogan</a>
13	O&M for Ventilation and Exhaust systems		Carol Donovan, Tom Smith, Harris Sheinman
14	Laboratory Commissioning Process	Daniel Frasier	Carol Donovan, John Garrett Neubauer, Tom Smith, Wade Conlan, Glenn Friedman, Harris Sheinman, Mike Amstadt
15	HVAC System economics		Rajendera Kapoor, Tao Zhang
16	Microbiological and Biomedical Laboratories	Daniel Frasier	Carol Donovan, Rami Alkahlil, Harris Sheinman, Wei Sun
17	CFD Modeling of Laboratory Ventilation	Kishor Khankari	Brad Cochran, Chris Kirchner
18	Sustainable Design	Rachel Romero	Brooks Stout, Chris Kirchner, Tao Zhang, Roland Charneux
SG	Smart Guide	Christine Reinders	
NEW	Lab Classification – How to use Guide (placed in smart guide)		Adam Bare
Add to 5	Exposure Control Devices	Tom Smith	Salil Sansare, Harris Sheinman

<b>20-NEW</b>	<b>Ventilation Effectiveness</b>	Kishor Khankari	Salil Sansare
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