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**DRAFT**

### TC/TG/MTG/TRG MINUTES COVER SHEET

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

TC/TG/MTG/TRG No. \_\_\_\_\_ TC 9.10 \_\_\_\_\_ DATE February 3, 2026 \_\_\_\_\_

TC/TG/MTG/TRG TITLE \_\_\_\_\_ Laboratory Systems \_\_\_\_\_

DATE OF MEETING February 3, 2026 \_\_\_\_\_ LOCATION Las Vegas, Nevada \_\_\_\_\_

| MEMBERS PRESENT   | YEAR APPTD | MEMBERS ABSENT | YEAR APPTD | EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE |
|-------------------|------------|----------------|------------|----------------------------------------------|
| Kelley Cramm      | 2024       | Ken Crooks     | 2023       | Christine Reinders (CM)                      |
| Chris Kirchner    | 2022       | Rachel Romero  | 2022       | Brendon Burley (CM)                          |
| Kurt Monteiro     | 2024       | Danny Sanchez  | 2023       | Brad Cochran (CM)                            |
| Anne Juran        | 2023       |                |            | Gordon Sharp (CM)                            |
| Justin Garner     | 2024       |                |            | Mark Richards (CM)                           |
| Mark Malkin       | 2023       |                |            | Victor Cinola (CM)                           |
| Jim Coogan        | 2024       |                |            | Roland Charneux (CM)                         |
| Ryan Parker       | 2023       |                |            | Keith Hammelman (CM)                         |
| Christine Samchuk | 2025       |                |            | Victor Neuman (CM)                           |
| Tom Smith         | 2025       |                |            | Ryan Soo (CM)                                |
|                   |            |                |            | Mark Vanderkooy (CM)                         |
|                   |            |                |            | John Varley (CM)                             |
|                   |            |                |            | Paul Lemestre (CM)                           |
|                   |            |                |            | Brooks Stout (CM)                            |
|                   |            |                |            | Danny McGrail (CM)                           |
|                   |            |                |            | Greg Gross (CM)                              |
|                   |            |                |            | Joy Cox (CM)                                 |
|                   |            |                |            | Jason Atkisson (CM)                          |
|                   |            |                |            | Traci Hanegan (CM)                           |
|                   |            |                |            | Kishor Khankari (CM)                         |

|  |  |  |                            |
|--|--|--|----------------------------|
|  |  |  | John Castelvechi (CM)      |
|  |  |  | Scott MacMurray (CM)       |
|  |  |  | Gerald Williams (CM)       |
|  |  |  | Brendan Dingman (CM)       |
|  |  |  | Robert Weidner (CM)        |
|  |  |  | Duncan Green (CM)          |
|  |  |  | J. Patrick Carpenter (CM)  |
|  |  |  | Raajesh Kumar (CM)         |
|  |  |  | Ali Salim Shirazi (CM)     |
|  |  |  | Kennedy Krakalovich (G)    |
|  |  |  | Guy Perreault (G)          |
|  |  |  | Wilburn Larson (G)         |
|  |  |  | Antonio Lewis (G)          |
|  |  |  | Kurt Rindoks (G)           |
|  |  |  | Cristiano Pereira Dias (G) |
|  |  |  | Pierre Servant (G)         |
|  |  |  | Ken Shifflett (G)          |
|  |  |  | Ara Sardooee (G)           |
|  |  |  | Patrick Seguin (G)         |
|  |  |  | Lee Benel (G)              |
|  |  |  | Jesse Fisher (PCM)         |
|  |  |  | Charles Gans (PCM)         |
|  |  |  | Ray Delgado (PCM)          |
|  |  |  | Cliff Gillio (PCM)         |
|  |  |  | Kimberly Thompson (PCM)    |
|  |  |  | David Gagnon (PCM)         |
|  |  |  | Gary Shamshoian (PCM)      |
|  |  |  | Jason Su (PCM)             |
|  |  |  | George Abdelmalek (PCM)    |
|  |  |  | Manish Kalmegh (PCM)       |
|  |  |  | Beth Mankameyer (PCM)      |
|  |  |  | Dianthe Van Weerden (PCM)  |
|  |  |  |                            |

| <b>DISTRIBUTION: <i>All Members of TC/TG/MTG/TRG plus the following:</i></b>                 |                                                   |
|----------------------------------------------------------------------------------------------|---------------------------------------------------|
| TAC Section Head: Joy Altweis                                                                | SH9@ashrae.net<br>Where 9 is the section number   |
| All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters<br>(Research, Standards, ALI, etc.) | See ASHRAE email alias list for needed addresses. |
| Steve Hammerling,<br>Assistant Manager of Research & Technical Services                      | AMORTS@ashrae.net                                 |

Note: These draft minutes have not been approved and not the official, approved record until approved by the TC.

## **CALL TO ORDER**

Kelley Cramm called the meeting to order at 3:30 PM PST

## **CODE OF ETHICS**

*In ASHRAE meetings, we will act with honesty, fairness, courtesy, competence, inclusiveness and respect for others, which exemplify our core values of excellence, commitment, integrity, collaboration, volunteerism and diversity, and shall avoid all real or perceived conflicts of interest. Our culture is one of inclusiveness, acknowledging the inherent value and dignity of each individual. We celebrate diverse and inclusive communities, understanding that doing so fuels better, more creative and more thoughtful ideas, solutions and strategies for the Society and the communities our Society serves. We respect and welcome all.*

<https://www.ashrae.org/about/governance/code-of-ethics>

## **TITLE, PURPOSE, SCOPE for TC9.10**

Kelley highlighted our Title, Purpose, and Scope: TC 9.10 is concerned with HVAC components for laboratory systems and their use therein. These components include but are not limited to air intakes, supply air conditioning systems, air distribution methods, laboratory fume hoods, biological safety cabinets, exhaust systems and exhaust discharge. The technical committee will address the unique requirements of all types of laboratories. These laboratories include but are not limited to nuclear, pharmaceutical/medical, general chemistry, and teaching. Additional TC 9.10 concerns are; (1) the reduction of energy usage in laboratory systems, (2) the monitoring of government regulations affecting laboratory operation.

## **INTRODUCTIONS**

The group did not do self-introductions in the interest of time.

Guy Perreault called roll call for voting members. Quorum has been established (11 of 13 members present)

## **WEBSITE**

Jim Coogan reported that he is still updating the website. Kurt is still willing to roll into the webmaster position.

## **MEMBERSHIP**

Guy reported Quorum achieved.

## **MEETING MINUTES**

Justin **moved** and Jim seconded to approve the minutes from the last meeting as distributed. The minutes were **approved unanimously**. Minutes will be revised to note in person and virtual attendance. The motion was passed unanimously. 10-0-0-2 – CNV

## **SECTION HEAD REPORT**

No section head present

You can contact our section head at: SH9@ashrae.net  
For general questions email: [Asktae@ashrae.net](mailto:Asktae@ashrae.net)

## **TOM SMITH'S CORNER**

No Report

## **GUIDELINE 36 UPDATE**

Jim Coogan gave a report, now working on laboratory exhaust sequences. Additional updates are out for public review. Most recent meeting was very collaborative. If you have experience with laboratory exhaust controls look for the new updates when they come for public review.

## **PROGRAM SUBCOMMITTEE REPORT**

Rachel Romero was absent. Kelley reported that we had 3 programs at this meeting, a panel, a forum, and a seminar. The programs were well received at the conference. The seminar was co-sponsored with the MTG on air change rates. Tom reported that the MTG is tying together the various spaces and their use of air change rates.

Recommendation made to move the Guideline 36 proposal to Chicago.

See attached report for more information.

## **RESEARCH SUBCOMMITTEE REPORT**

Greg Gross provided a report. 46 Active research projects are currently underway. Reminder that all ASHRAE members have access to all research project final reports. As of this meeting there are 3 RTARs, 3WSs, 6 TRP's under review. The ASHRAE Research Portal is live, aim to use for all RTAR/WS submissions for March 15<sup>th</sup> deadline. TC 9-10 has 2 Active research projects. 1835-RP and 1936-RP. There are 2 projects in revision, 1963 WS, and 1996 RTAR.

See attached report.

## **LAB CLASSIFICATION SUBCOMMITTEE**

Guy provided a report. Updated document is under review internally. After this internal review we will submit the revised version for external review. All comments will be incorporated and published through ASHRAE. Current draft is available on Basecamp for review. Goal to receive comments by the end of this month and get a final version to vote on at the Annual meeting.

See attached report.

## **STANDARDS SUBCOMMITTEE**

Justin Garner gave a report. Standard 110 has voted to reinstate the 2016 version while revisions are being made. Standard 170 met today and has no major updates for laboratories. They are working on defining unidirectional flow. Look for a public review on this draft interpretation. Std 62.1 2025 has been published. The minimum ventilation for Laboratories was updated and an update that the AHJ can set airflow rates required.

See attached report.

## **NSF 49**

Justin gave a report. NSF 49 (Bio-Safety cabinets) working group evaluating language mandating exhaust requirements. There is now data published from testing on airflow requirements.

## **DESIGN GUIDE**

Ann Juran provided a report. Table of contents and reorganization has been completed. The new version has been uploaded to basecamp. The chapters are now available to start their revisions. There is a training scheduled on how to do edits to the chapter. The goal is to have all edits completed before the Annual meeting in Austin. Plan is to submit the updated version for publication in Winter 2027.

## **HANDBOOK SUBCOMMITTEE**

Mark Malkin reported on Chapter 17 for Applications 2027. Revised version has been uploaded to basecamp incorporating comments. Goal is to have all comments in March to circulate the final version to the voted to approve in Austin at the Annual meeting to be published in the next copy of the handbook. Jim Coogan would like to add language on sequences.  
See attached report.

## **ASHRAE JOURNAL**

Roland Charneux reported that there was an article on Air Change Rates by Kishor. Kishor is looking for feedback on this article. There is a potential article in development on fume hood exhaust fans.

## **ALI COURSES**

**Laboratory Design Course** – Danny McGrail – Danny reported that he had 22 attendees, the audience was active in participating.

**Laboratory Exhaust Course** – Brad Cochran – Brad has plans to update his course for June held virtually.

**Laboratory Controls Course** - Jim Coogan – This was the debut of this new course held at this conference. There were 20 attendees, the content could still use some revisions. If you have feedback for Jim on this send it to him. The course plans to happen again virtually in April. Justin has some material to provide Jim with feedback on course content.

## **LIAISON REPORTS**

TC 1.4 Control Theory and Application – Jim Coogan reported on updated Guideline 36 updates.

TC 2.2 Plant and Animal Environment – Ann Juran reported are trying to focus on animals again. TC 2.2 would like to co-sponsor a program on vivariums.

TC 4.3 - Ryan Parker reported that Handbook chapter 46 (laboratory exhaust) is revised and ready for publication. Reach out if you're able to review the draft chapter.

TC 5.1 Fans – Mark Vanderkooy reported.

TC 5.3 Room Air Distribution – Kishor reported no significant changes to report. Looking for a co-sponsor for a forum in Austin.

TC 7.6 Building Energy Performance – Ali reported that chapters have been updated, and commercial building energy audit book will have a new version reported

TC 7.9 Building Commissioning –Justin Garner reported no major updates for this TC.

TC 9.2 Industrial Air Conditioning and Ventilation. No report

TC9.6 Healthcare Facilities – Traci reported she visited the United Nations for a global call for healthy indoor air. Airclub.org is available with resources and you can sign a global pledge for healthy indoor air. Innovative airflow cooling devices for physicians in the OR like wearable devices. This might also be applicable to lab equipment personnel who are wearing PPE.

TC9.7 Educational Facilities – Keith Hammelman reported a push to collaborate on maker spaces.

TC9.11 Clean Spaces – Roland provided a report that the clean room design book is under review.

MTG ACR – 2 Research projects ongoing.

62.1 Ventilation for Acceptable IAQ – Brendon Burley

90.1 – Kelley provided a report.

SMACNA – No report

ISPE – no report

AIHA Lab Health & Safety – Jim Coogan gave a report.

ASTM Z9.5 – no report

I2SL – Gordon reported on a new I2SL See attached slides.

Title 24 – California Energy Code – no report.

### **NEW BUSINESS**

No new business.

### **CLOSING THOUGHTS**

Next Meeting – 3pm in Austin, Texas on Tuesday June 30<sup>th</sup>, 2026

**ADJOURN** It was moved and seconded to adjourn at 5:29 PM PST

**ASHRAE TC 9.10 Laboratory Systems  
Program Sub Committee  
Tuesday, January 13, 1:00 - 2:00 PM EDT  
Minutes**

**Program Sub Committee Meeting, Las Vegas Winter Meeting 2026**

**Attendees:** Rachel Romero, Kelley Cramm, Tom Smith, Robert Weidner, Greg Gross, Leonard LeGrand, Kishor Khankari, Roland Charneaux, Ryan Parker, Christine Reinders, Chris Kirchner, Jim Coogan, Cliff Gillio, Kurt Monteiro

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**1. Review of Roles:**

Programs Chair:

- Maintain a list of program ideas
- Solicit program chairs and speakers
- Solicit reviewers for Conference Papers
- Assist in submitting programs online
  - Go to Track Chair or ASHRAE staff for assistance
- Serve as the liaison between your TC and CEC
- Not responsible for presenting all of your TC's programs
- Notify chairs of areas of potential conflict times for TC 9.10:
  - TC 9.10 meetings on Tuesday from 3:30-6 pm
  - SGPC Guideline 36- Monday 8 am -12 pm (avoid if possible)
  - Other?

Session Chair:

- Develop a detailed **program abstract** and identify speakers (contact Track Chair with questions)
- Upload the required information on the session and speakers to the Conference website
- Preview speaker presentations to check that they meet the ASHRAE Conference Presentation Policy (found at <https://www.ashrae.org/file%20library/conferences/speaker%20resources/>)
- Make sure speaker presentations are uploaded prior to the Conference
- Coordinate presentations to minimize overlap and make sure the timing is correct
- Introduce and monitor session at the Conference
- Assist authors in identifying learning objectives & completing Q&A

**2. Sponsored Program in Las Vegas:**

**Panel 3: Sparking Sustainability: Powering the Shift to All Electric Laboratories**

Sunday, February 1 1:30 PM – 3:00 PM PST

Caesars Palace Las Vegas, PS, Octavius V/VI

Session Type: Panel Program Level: Intermediate Program Track: Future-Proofing the Built Environment

Summary:

Laboratories are energy-intensive, making their electrification crucial for decarbonization. Yet as a place of research and innovation, their unique demands pose significant design and construction challenges, especially for fully electric systems. Join our panelists as they share real-world experiences, innovative solutions, and critical lessons learned in building the next generation of high-performance, sustainable all-electric labs.

Chair: Ryan Soo

**Forum 6: Opportunities to utilize AI in the design and operation of laboratory research facilities.**

Wednesday, February 4 9:45 AM – 10:45 AM PST

Caesars Palace Las Vegas, P, Milano I/II

Technical Program: Technical Program Sessions Session Type: Forum Program Level:

Intermediate Program Track: Artificial Intelligence

Summary:

This forum will discuss the integration of AI into laboratory HVAC design and operation and how it may offer potential for energy efficiency, safety, and performance. AI-driven modeling can optimize system sizing and airflow distribution during design, reducing over-engineering and costs. In operation, machine learning algorithms enable predictive maintenance, dynamic airflow adjustments, and real-time anomaly detection to maintain precise environmental conditions while minimizing energy consumption. Additionally, AI can analyze historical data to improve fume hood management and respond to variable laboratory occupancy. These capabilities collectively enhance sustainability, occupant safety, and operational reliability in research laboratory environments. (Written by ChatGPT).

Chair: Brad Cochran

**Seminar 41: Are Ventilation Equivalents Really Equivalent?**

Tuesday, February 3 11:00 AM – 12:30 PM PST

Caesars Palace Las Vegas, (P), Neopolitan III/IV

Technical Program: Technical Program Sessions Session Type: Seminar Program Level:

Intermediate Program Track: Indoor Environmental Quality for Healthy Buildings

Summary:

Beyond the COVID-19 pandemic's emphasis on IAQ and ACH, sufficient ventilation remains important for protecting building occupants, businesses, and global economies against influenza, measles, RSV, and a next epidemic. ASHRAE Standard 241 codifies increased protection levels as Infection Risk Management Mode (IRMM), achievable through Equivalent Clean Airflow (ECA), perhaps via UVGI and enhanced filtration as alternatives to increased

ventilation. However, ECA shares with space ventilation questions about effectiveness in the breathing zone. This seminar presents case studies combining ventilation, filtration, and UVGI to achieve ECA, along with uncertainties in these technologies and their interaction with airflow paths and incomplete mixing.

Chair: Philip Naughton, PE (retired), CEM

### 3. Future ASHRAE Conferences

June 27-July 1, 2026 – Austin, TX

Jan. 23-27, 2027 – Chicago, IL

June 12-16, 2027 – New Orleans, LA

Feb 5-9, 2028 - Orlando, FL

June 24-28, 2028 – St. Louis, MO

#### 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)

- **Austin Annual Conference 2026 Conference Deadlines**
  1. Wednesday, January 7, 2026 | Website Opens for Extended Abstracts and Seminar, Workshop, Forum, Debate and Panel Proposals
  2. Wednesday, February 25, 2026 | Panel, Seminar, Forum, Workshop, and Debate Proposals Due
- **Austin Tracks**
  1. Fundamentals and Applications
  2. HVAC&R Systems & Equipment
  3. Refrigeration and Refrigerants
  4. Research Summit
  5. Workforce Development
  6. Ground Source Heat Pumps
  7. Hot Climate Building System Design, Operation and Resilience
  8. AI in Building Design and Construction
  9. Building Decarbonization
- **Suggested formats:**
  - **Seminar:** feature presentations on subjects of current interest
  - **Panel Discussion:** can feature a broad range of subjects and explore different perspectives on industry related topics. This session format includes a panel of 3-4 speakers each addressing a facet of the session topic, followed by an interactive discussion lead by the session chair.
  - **Debates:** highlight hot-button issues commonly faced by our membership. Industry experts, either on teams or as individuals, argue opposing sides of an issue, concluding

with position summaries and audience feedback.

- **Forums:** The sessions are “off-the-record” discussed held to promote a free exchange of ideas. Reporting of forums is limited to allow individuals to speak confidentially without concern of criticism. There are no papers attached to forum
- **Workshop:** enable technical committees and other ASHRAE committees to provide a series of short presentations on a topic requiring specific expertise. These short presentations are provided with an increased emphasis on audience participation and training in a specific set of skills (60 or 90 minutes)

#### 4. Proposed Programs for Austin:

- Austin: Lab case studies to decarb
  - Jason Atkisson (USGS)?? Or Jessica Mangler
  - GSA/FDA- Smith Group- Rob Thompson or Adam Denmark
  - Track: Pathways to Building Decarbonization
  - Wade Conlan- Case studies
  - Chris Kirchner- refrigerant switch out at pharma sites?
  - Track: Building Decarb
  - **Chair: Adam Donovan**
  - AI: RR: Reach out to Adam to see if group wants to submit for Austin
- Austin: Guideline 36 in Labs
  - **Chair: David Rausch**
  - AI: David Going to talk to Jim about submitting this.
  - Air handlers
  - Speakers: Jim Coogan
  - This is out for public review 6/2025
- Maybe: Total flow through the building- System operating mode test- turn down air flow rates fan flow doesn't go down
  - Workshop Discussion - Presenters: Tom Smith
  - Start with a short presentation
  - Track: Ventilation and Indoor Environmental Quality for Healthy Buildings Or Pathways to Building Decarbonization
  - Special requests: re-submission from Jim Coogan
    - Jason Atkisson and Beth Mankameyer interested
    - Justin Garner from Engineered air balance
    - Brad Cochran- exhaust systems
  - Include facility operator? To talk about controls
  - **Chair: Christine Reinders**

- AI: Christine to follow up on interest for when to submit this.

#### On hold:

- Chicago?: Keith Hammelman- Education committee- 3-D printing exhaust?- could be case study as part of a different grouping – Makerspace- Kelly Cramm-
  - Elizabeth C at Cornell?
  - Tom could make some IH recommendations?
  - UL2904 standard
  - Panel discussion format
  - Look for applicable track for Chicago
  - Kelly to ask CEC about a track that this could apply to.
  - Chair: Christine Reinders
- Chicago: General air cleaning seminar
  - 145 came out of this
  - How this may relate to labs?
  - Bob to work with 185.5 (testing protocols) to get speakers together- SPC 234
  - **Chair: Bob Weidner**
- Chicago: Control tuning and lab performance- Ryan Soo
  - Tom Smith? Ryan?
  - Ensure systems are tracking the controls
  - Someone from commissioning-
  - Case study from Tom
  - Chair: Rachel Romero
  - AI: RR to bring up at committee meeting for speaker recommendations
- Chicago: Characterize savings of controls
  - PG&E through Tom Smith- 8-10 different facilities- won I2SL energy award-
  - Owner, **utility**, and performance contracting, vendor provider to enable the program
  - Correlation between flow and energy to \$
  - Chair: Tom to suggest on this, consider someone on Siemens, Kurt Monteiro
- On hold: Standard 100 Energy Efficiency and emissions efficiency for existing buildings- lab specific tables- Glenn Friedman
  - Forum- How to categorize lab? Can we define this enough to start research on this.
  - Could work with Healthcare TC, manufacturing, data centers 9.9

#### Unassigned:

- Energy modeling of labs?
  - ORNL?
- Commissioning in labs with TC 7.9- Justin Garner

## **5. New topics**

- Infectious disease- Std 240- Forum- Kishor Khankari
  - Discussion around lab relevance in this topic

## **ASHRAE TC 9.10 Research Subcommittee - 2026 Winter Meeting Minutes (January 14, 2026)**

### **1. Attendees**

- a. Kelley Cramm, Robert Weidner, Greg Gross, Rachel Romero, David Rausch, Mark Malkin, Jason Atkisson, Kimberly Thompson, Christopher Kirchner, Leonard LeGrand, Christine Reinders-Caron, Ryan Parker, Pierre-Luc Baril, Bill Stump, Christine Samchuk, Tom Smith

### **2. Introductions and News**

- a. Research Chair – Greg Gross, Section 9 RAC Liaison - Conor Murray, RAC Vice Chair - Roland Charneux
- b. No ASHRAE-wide research or other general RTAR updates provided.

### **3. Current Research Projects**

- a. 1835-RP - Characterizing the Performance of Entrained Flow Stacks
  - i. Following PMS meeting and vote during Summer 2025 meeting, the team has decided to move forward with testing of a second fan.
  - ii. A no-cost extension was planned to be requested, no update provided on status.
  - iii. Statistical analysis (T-test) is planned/proposed to discern a difference between the two data sets once the second fan is tested.
  - iv. Based on an update provided in November 2025, the second fan (induced flow nozzle) has been installed but data collection has been delayed due to drone availability.
    - 1. No update provided for Dec/Jan, possible update at Winter 2026 conference.
  - v. PMS meeting planned for Winter 2026 conference, currently scheduling.
- b. 1936-RP - Evaluation of Relative Impact of Air Change Rate (ACR) and Airflow Patterns on the Ventilation Performance of Indoor Spaces
  - 1. Awarded to Worcester Polytechnic Institute (\$399,755), 36-month duration
  - 2. Roland Charneux is PES chair
  - ii. Variety of Groups working on this - I2SL, ASHRAE MTG ACR, SP 129
  - iii. Co-funded by Price, Phoenix
  - iv. Per Roland – Research is progressing well, meeting every month.

### **4. Research Projects in RTAR or Work Statement**

- a. 1963-WS – Methodology to Measure In-situ Chemical Emissions of Lab Equipment and Processes
  - i. Accepted by RAC as WS as of May 2025
    - 1. Roland Charneux spearheaded, Tom Smith co-authored, Rachel Romero refined
  - ii. AIHA may be interested in collaboration based on recent MOU...possible co-sponsor
    - 1. Jim Coogan will take the lead on coordination between groups
    - 2. Tom and Roland met with AIHA, interested in supporting, would like summary of impacts and benefits.
  - iii. PES Volunteers
    - 1. Brad Cochran, Guy Perreault, Rachel Romero, Roland Charneux, Tom Smith, Raajesh Murugesan
  - iv. WS was returned with comments in October 2025 following RAS fall meeting.
    - 1. Deadline for resubmission by December 15, 2025 was missed, next deadline is May 15, 2026
      - a. Roland/Tom/Rachel to revise – Work is in progress for May 2026 submission.

- b. 1996-RTAR – Test Method to Evaluate Cross Contamination in Energy Recovery Wheels in Critical Spaces – Part 2
- i. RTAR submitted and has been accepted by RAC for development into a WS with comments as of October 2025
  - ii. May 15, 2026 is next deadline for WS consideration by RAC during the Summer 2026 meeting.
  - iii. Robert Weidner was primary author, working on revisions, check with previous 1780 team for co-sponsorship.
  - iv. Current RTAR committee: Bob Weidner, Roland Charneaux, Gemma Kerr, Brendan Burley, Roy Bohannon, Eric Erdman, Matthew Friedlander
  - v. Concerns to be studies:
    1. Impact of velocity through the wheels (500 fpm)
    2. Test simultaneously with different chemicals to reduce the cost of testing
    3. Sensible only wheel test
    4. Transfer at low concentration of chemicals
  - vi. Still interest in proposing a forum to build awareness from previous research.
    1. Results of Tom Smith's testing has brought up maintenance and operability concerns.
    2. Topic could focus on Energy Savings vs. Safety
    3. Keep pushing on this for a possible Program topic...important to share the research that has been completed.

## 5. Research Topics Under Consideration (but no specific movement)

| Topic                                                         | Interest/Responsibility                       | Status/Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hourly Data on Lab Plug Loads for Design Guidance             | Rachel Romero                                 | <ul style="list-style-type: none"> <li>• RTAR has been initiated...</li> <li>• Coordinate with I2SL Labs2Zero and Laboratory Benchmarking Tool</li> <li>• TC 9.6 is collecting data...possible to collaborate? <ul style="list-style-type: none"> <li>○ RP-1816...imaging equipment (MRI, etc.)</li> <li>○ Inquire about WS info from TC 9.6 for guidance?</li> </ul> </li> <li>• TC 4.7, TC 7.6 possible co-sponsors</li> <li>• Could be useful for design guide</li> <li>• Previous RP that provided guidance for current handbook was run by Mo Hosni at KSU...contact.</li> <li>• Call for volunteers...Kimberly Thompson, Bob Weidner</li> </ul> |
| Demand Control Ventilation in Labs via Contaminant Monitoring | David Rausch                                  | <ul style="list-style-type: none"> <li>• Goal of reducing airflow rates in labs</li> <li>• Possible speakers...Kishor, Gordon Sharp, Tom Smith</li> <li>• Previously discussed as ready to present...just need to get a couple more speakers.</li> <li>• Possible TC 9.11 cosponsor?</li> <li>• Not necessarily a research topic...but would be interested in validation, published application standards...possible Program seminar</li> <li>• TC 7.9 Commissioning may be interested in partnering</li> </ul>                                                                                                                                       |
| Using AI to Better Operate Buildings                          | Jim Coogan                                    | <ul style="list-style-type: none"> <li>• Low Priority</li> <li>• Currently, AI focused tracks at recent/upcoming conferences</li> <li>• Jim will poll the Siemens team to see if there is interest/progress <ul style="list-style-type: none"> <li>○ Trend analysis, actionable items, preventative maintenance</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                |
| Duct Velocities for Lab Exhaust                               | Tom Smith                                     | <ul style="list-style-type: none"> <li>• Low Priority</li> <li>• Transport velocities required for chemical removal, prevention of condensate, heated acid vapors</li> <li>• Coordinate with 110 committee for guidance</li> <li>• Survey of issues, chemicals, maintenance/operations to inform possible guideline...possible article.</li> </ul>                                                                                                                                                                                                                                                                                                    |
| <del>Hazardous Emissions in Vivarium Exhaust</del>            | <del>No Volunteers – Removing from List</del> | <ul style="list-style-type: none"> <li><del>• Low Priority</del></li> <li><del>• Concerned with nuisance odors, air changes, historic design practices, advancements in technology</del></li> <li><del>• Discussion with TC 2.2</del></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                      |

## 6. Review of Pertinent Ongoing Research Outside of TC 9.10

- a. Standard 90.1 Updates
  - i. Jim Coogan provided update that 4 primary topics to be added, not in public review yet, but has been through the committee.
  - ii. Proposed that TC 9.10 review updates and create RTAR to evaluate energy savings methods...comparative analysis.
- b. ASHRAE Standard 110 Method of Fume Hood Performance
  - i. Final draft completed with committee vote held in January 2025.
    - 1. SPC voted to reaffirm old standard, not ready to replace with new standard.
  - ii. Goal for revised standard to be published in 2027
- c. ASHRAE Standard 129 Estimation of Ventilation Effectiveness for Ventilated Indoor Spaces
  - i. 4 subgroups currently working on: (1) Original Research Method, (2) New Field Test Methods, (3) CFD Method, (4) Metrics and Definitions
  - ii. Review targeted for March 2026 with ANSI review by EOY 2026. Possible publication in 2027 per Tom Smith at Standards subcommittee meeting.
- d. ASTM WK88278 New Practice for Laboratory Ventilation (Previously ANSI/ASSP Z9.5 American National Standard for Lab Ventilation)
  - i. Recently migrated standard from ASSP to ASTM
  - ii. Jim Coogan leading effort and committee formation
    - 1. No current progress from last meeting.
  - iii. Many parts of standard do not match ASTM framework, rewriting will be needed per Jim Coogan and Brad Cochran to address these differences
    - 1. Evaluate keeping portions of Z9.5 that do not fit framework and add to laboratory handbook section or design guide
      - a. May need to be broken out into two or more standards... to address ASTM differences.
      - b. Possible organization into Practice, Guide, and Test method.
    - 2. Greg Gross planning to join ASTM committee.
- ~~e. 3D Printing Hazardous Issues (nano particles, chemicals, fumes, etc.)~~
  - ~~i. TC 9.7 discussing; Roland Charneux to follow up and also Jason Atkisson — Protocol for investigation for contaminant emission could be used for 3D. (Keith Hammelman was mentioned as potential lead) — Kelley Cramm interested; UL 2904 Test Method for assessing particle and VOCs from 3D printers~~
    - ~~1. Industrial hygienist review...papers are there, no current need for additional guidance.~~
- f. Bill Stump (TC 7.9 Building Commissioning) looking for opportunities to collaborate with TC 9.10
  - i. No specific topics at this time.
- g. David Rausch mentioned TC 9.11 Clean Spaces Literature Review

## 7. Open Floor for Research Topic Discussion

- a. No additional topics were provided during this meeting.

## 8. Adjourn

## **TC 9.10 Lab classification Subcommittee Meeting Minutes**

**1/13/2026**

Tom shared the August version of the document.

Folks who want to participate on the subcommittee:

Joy Cox

Pierre-Luc Baril

Leonard LeGrand

Document is intended to develop a risk based approach to ventilation based on what's happening in the lab and what hazards and processes are present. Collaborated with ASHRAE, AIHA, and ACS. Identified levels from 0 (no risk) to 4 (very high risk). Tom did some reorganization and updated content. Brad C made some comments. Jim will send info on lab DP control. Tom added room offset info.

Needs a thorough review. Guy Perreaut agreed to do a review. Would like to release for publication by the summer conference.

Pierre-Luc Baril and Adithya Suresh Athreya agreed to review. Bob W and Jim Coogan, Beth Mankameyer, and Cliff Gillio. Ryan Parker will review the lab exhaust additions. Rachel volunteered Otto to also review.

Dave Rausch will add the reviewers to BaseCamp.

Need to reach out to AIHA and ACS to ask them to review since they are co-sponsors. We will do this once the internal review is completed and we have a final draft.

Jim noted that the table and the guidelines above it don't seem to align. He will note this in his review.

## Attendees:



Kelley Cramm  
Organizer



Adithya Suresh Athreya (External)



Cliff Gillio (External)



Coogan, Jim (SI B PRO AUT PD BFG) (Unverified)



Cox, Joy (Unverified)



Danny McGrail



Greg Gross (External)



Guy Perreaut (Unverified)



Kimberly Thompson (Unverified)



Kirchner, Christopher (Unverified)



Leonard LeGrand (External)



Mankameyer, Beth (RC-US SI B PSE AUT LS) (Unverified)



Miller, Madison (External)



Pierre-Luc Baril (Unverified)



Rausch, David (He/Him/His) (Unverified)



Ray Delgado



Reinders-Caron, Christine [A LAB] (External)



Robert Weidner (External)



Roger Huggins (External)



Roland Charneux (Unverified)



Romero, Rachel (External)



Ryan Parker (External)



Thomas Smith (External)

## **TC 9.10 Standards Sub-committee Meeting (January 14, 2026 @11 AM CST) – Las Vegas 2026:**

**Attendees (17):** Justin Garner (Chair), Mark Malkin, Zara Sardooee, Guy Perreault, Tom Smith, Greg Gross, Robert Weidner, Jason Atkisson, Kelley Cramm, Madison Miller, Jim Coogan, Kimberly Thompson, Christopher Kirchner, Leonard Legrand, Christine Reinders-Caron, Roger Huggins, Ryan Parker

### **ASHRAE Standards and Guidelines**

Guideline 36 (Best in Class HVAC Control Sequences) Jim Coogan reported; Kelley Cramm, Ryan Soo, Jason Atkisson, Greg Gross, Justin Garner

- Traci Hanegan will reach out to TC 9.6 to discuss how these sequences affect healthcare applications – no update
- Second Public Review underway for Room Sequences; third public review forthcoming
- Lab Exhaust still in committee (Las Vegas?); need additional discussion at the committee level – Jim Coogan will try to get this on the active agenda; Greg, Bob, Guy, Justin and Jason will review with working group; ask to add Bob to the working group (Jim will request)

Standard 62.1 (Ventilation for IAQ) – Brendon Burley reported

- Published in November. Successful in incorporating a revision to minimum laboratory exhaust rates to 0.35 cfm/sf, which is roughly equivalent to 2 ACH. Also added a specific exception allowing the owner's health safety official to adjust exhaust rates.

Standard 90.1 (Energy Code) – Jason Atkisson (Liaison) Jim Coogan reported

- Required sash closers, unoccupied setback, room cooling coil, heat recovery
- Tom Smith discussed concerns with maintenance challenges with sash closers
  - Jim asked Tom to bring Fume Hood concerns to the committee
- Jim is working on a better sequence for unoccupied setbacks – involve safety officers
  - Same effort with Title 24
- Based upon working group and feedback from TC 9.10, an ISC was written; evaluated four items, one was removed, three were edited
- Need to review the ISC and monitor for public review
- Jim discussed with Ind. Hygiene Association (AIHA) Lab committee; updates in the future

Standard 100 (*Energy and Emissions Building Performance Standard for Existing Buildings*) – Glenn Friedman (absent) – No report

- To be added as pertinent to TC 9.10 (90.1 of existing buildings)
- Is there a way to classify labs to allow them to be included as an existing building types?

Standard 110 (Laboratory Fume Hoods Performance Testing) Tom Smith reported / Kurt Rindocks

- Voted to re-instate existing 2016 version in Orlando for ANSI compliance
- Round Robin testing on tracer gas (IPA and Propylene)
  - IPA still needs some work procedurally (ejector) – modified process in 6 months; full ANSI process possibly 12-18 months

- Propylene is difficult as a field gas (explosive)
- Working Groups formed – Testing Method (Ejector / Detector) Group led by Jeremy (Kewaunee); 2027+ for next version

Standard 129 (Measuring Air Change Effectiveness) Kishor Khankari / Tom Smith reported

- Committee's objective is to evaluate ventilation effectiveness
- MOT is currently for lab testing
- Modifying standard to add field testing (98% complete) with hybrid air tracer (IPA)
  - Airflow patterns are driving factor
  - CFD modeling is evaluated against field data
  - Tom presenting the field testing method in Phoenix at STD meeting
  - Tom will post a link on Basecamp
- Formed four task groups – lab, CFD, field testing, metrics
- New definitions section being developed
- Preliminary Public Review targeted for March 2026 with ANSI review by end of 2026

Standard 170 (Ventilation of Health Care Facilities) – Brendon Burley – reported in main meeting / Traci Hanegan (absent)

- No updates
- 

Standard 241 (Control of Infectious Aerosols) Kishor Khankari (Absent) -Tom Smith reported

- Update Field Testing and Appendix – Equivalent Outside Air Method
- Updating to ANSI
- Submitted for Public Review – many comments received
- Working Groups formed to address comments
- Equivalent rates are challenging

## **Other Industry Standards**

Z9.5 (Laboratory Ventilation) Jim Coogan reported

- Need to advance the content for failure scenarios
- Moving document into ASTM format – largest current hurdle
- All Z9's moved to ASTM - will get a new number (TBD)
- Asked for new membership to help sustain the committee
- No additional updates

NSF 49 (Bio-Safety Cabinets) Justin Garner

- Working group evaluating language in the standard that mandates dedicated exhaust systems for 2B2 cabinets; committee recognizes the reality of current design applications and has asked for input from the lab controls marketplace
- BSC manufacturers agreed to provide additional data to support the 2% exhaust accuracy requirement; Justin Garner is tasked with discussing possible specification

language for the 2% performance requirement with LCS manufacturers and the design community (TC 9.10)

- In the recent meeting (Jan. 2026) of the task group, Nuaire shared data showing 5% accuracy at a constant airflow and a constant system would be acceptable; task group asked Justin Garner to edit current language coordinating with LCS manufacturers and ASHRAE committee

NFPA 45 – Ken Crooks (absent) – No report

- 2024 edition is out with section on ductless fume hoods
- Healthcare labs added
- 1<sup>st</sup> draft out for public review in October 2025

NIH Design Requirements Manual – Jim suggested that we follow; review for changes

**Respectfully submitted by Justin Garner, February 3, 2026**

## TC 9.10 Laboratory Design Guide Subcommittee

Meeting Minutes

15 January 2026

Virtual (via Teams)

### Attendees:

Kelley Cramm

Anne Juran

Roland Charneux

Greg Gross

RaajeshKumar Murugesan

Zara Sardooee

Charles Gans

Guy Perreault

Mark Malkin

Thomas Smith

Kurt Monteiro

Daniel Frasier

Ryan Parker

Robert Weidner

Christopher Kirchner

Christine Reinders-Caron

### Discussion:

1. Table of Contents (TOC) Committee work has been completed
  - a. Used the OPR as a guide for the flow
  - b. General reorganization – many chapters are renumbered
  - c. A few chapters have been broken apart with portions moved to other chapters
2. Chapters are ready to go!
  - a. I've moved parts around and prepared chapters for review / rewrite.
  - b. I've made comments for where/why I've moved and deleted things
  - c. Track changes are enabled and locked by ASHRAE
3. Completion Goals
  - a. Chapter Lead complete by Summer 2026 meeting
  - b. Training meeting set for 2/11 at 5pm EST
    - i. Track changes
    - ii. Comments
    - iii. File management / version control

**Microsoft Teams** [Need help?](#)

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Passcode: Cq69uW9G

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Phone conference ID: 171 629 003#

4. Chapter status
  - a. Colors on "Title" cell indicate *previous* status of chapter
5. Specific updates:
  - a. Chapter 14 (Controls) will need to be updated based on Guideline 36

- b. Chapter 7 should address sash closers and sash management programs (address in controls, and sustainability as well)
- 6. Integration with handbook update?
  - a. If you think of anything that needs to be added to either document, contact myself or Mark Malkin

#### Chapter status (updated for new TOC)

| Ch  | Title                                              | Chapter Lead                 | Edit/Review Team                                                                                                        | Notes                                                                      |
|-----|----------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| TOC |                                                    | Anne Juran                   | Tom Smith, Guy Perreault, Chris Kirchner, Doug Ross, Bob Weidner                                                        | Work complete                                                              |
| 1   | Introduction                                       | Bob Weidner                  |                                                                                                                         |                                                                            |
| 2   | Background                                         | Bob Weidner                  |                                                                                                                         |                                                                            |
| 3   | Design Overview                                    | Chris Kirchner               | John Castelvechi, Wade Conlan, Doug Ross                                                                                | -Some minor changes / adds needed                                          |
| 4   | Laboratory Planning                                | Brooks Stout, Jason Atkisson | Harris Sheinman, Danny Sanchez, Daniel Herzig<br>*bonus rvw by lab planner Lee Fitzgerald, a lab planner for SmithGroup | -Needs more work<br>-need to write about emergency scenarios               |
| 5   | Integration of Architecture and Engineered Systems | Brooks Stout, Jason Atkisson | Harris Sheinman, Danny Sanchez, Daniel Herzig<br>*bonus rvw by lab planner Lee Fitzgerald, a lab planner for SmithGroup | -new chapter created from parts of old Ch 4                                |
| 6   | Load Calculations                                  | Anne Juran, Danny McGrail    | Jason Atkisson, Kurt Monteiro, Glenn Friedman                                                                           | -new chapter created from part of Ch 1                                     |
| 7   | Exposure Control Devices and Exhaust Hoods         | Kurt Rindoks                 | Larry Meisenzhal, Brooks Stout, Ken Kuntz, Tom Smith, Ken Crooks<br>*bonus rvw by Luke Savage of Labconco               | -previously Ch 5                                                           |
| 8   | Airflow Patterns and Ventilation Effectiveness     | Wei Sun, Kishor Khankari     | Tom Smith, Salil Sansare, Dan Frasier, Jim Coogan, Brad Cochran, Chris Kirchner, Mike Carl                              | -new chapter from combining vent eff from old Ch 12 and CFD from old Ch 17 |
| 9   | HVAC Systems                                       | Brendan Dingman              | Bob Weidner, Brendon Burley, Charles Murphy, Wei Sun, Pierre Luc Baril, Chris Kirchner, Nathan Ho                       | -old Ch 6 + system selection from old Ch 3                                 |
| 10  | Air Treatment                                      | Bob Weidner                  | Rami Alkahlil, Charles Murphy                                                                                           | -previously Ch 8                                                           |

|             |                                             |                  |                                                                                                              |                                                                                                                                 |
|-------------|---------------------------------------------|------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| 11          | Exhaust Stack Design                        | Greg Gross       | Brad Cochran, Ken Kuntz, Glenn Friedman, Martin Stangl, Nathan Ho, Ryan Parker                               | -previously Ch 9                                                                                                                |
| 12          | Energy Recovery                             | Roland Charneux  | Bob Weidner, Brendon Burley, Chris Kirchner, Glenn Friedman, Charles Murphy, Otto Van Geet                   | -previously Ch 10                                                                                                               |
| 13          | Process Cooling                             | Jason Atkisson   | Brooks Stout, Charles Murphy, Nathan Ho                                                                      | -previously Ch 7                                                                                                                |
| 14          | Controls                                    | Jim Coogan       | Guy Perrault, John Garrett Neubauer, Brendon Burley, Brad Cochran, Doug Ross, Ken Kuntz, Jim Coogan, Wei Sun | -previously Ch 11                                                                                                               |
| 15          | Testing, Adjusting, and Balancing           | Wei Sun          | Tom Smith, Salil Sansare, Dan Frasier, Jim Coogan, Justin Garner                                             | -new chapter, but all part of old Ch 12                                                                                         |
| 16          | Commissioning                               | Daniel Frasier   | John Garrett Neubauer, Tom Smith, Wade Conlan, Glenn Friedman, Harris Sheinman, Mike Amstadt, Justin Garner  | -previously Ch 14<br>-address hood performance verification as part of acceptance<br>-add continuous monitoring from old Ch 5   |
| 17          | O&M for Laboratory HVAC Systems             | Tom Smith        | Guy Perreault                                                                                                | -previously Ch 13                                                                                                               |
| 18          | HVAC System Economics                       | Kurt Monteiro    | Tao (Tom) Zhang                                                                                              | -previously Ch 15                                                                                                               |
| 19          | Microbiological and Biomedical Laboratories | Daniel Frasier   | Rami Alkahlil, Harris Sheinman, Wei Sun                                                                      | -previously Ch 16                                                                                                               |
| 20          | Sustainable Design                          | Rachel Romero    | Brooks Stout, Chris Kirchner, Tao (Tom) Zhang, Roland Charneux                                               | -previously Ch 18<br>-much has been moved to other chapters<br>-add discussion of I2SL, Benchmarking Tool, Lab2Zero, Smart Labs |
|             |                                             |                  |                                                                                                              |                                                                                                                                 |
| Color code: | Completed                                   | Ready for Review | Edits underway                                                                                               | Unknown                                                                                                                         |

## **TC 9.10 Handbook Sub-committee Meeting** (Minutes by Mark Malkin on 1/16/26)

### Attendance at the meeting on January 16, 2026 (VM are Voting Members):

- Kelley Cramm (VM), Charles Gans, Leonard LeGrand, Mark Malkin (VM), Madison Miller, Ryan Parker (VM), Christine Samchuk (VM), Zara Sardooee, and Bob Weidner

### Other TC 9.10 members (who attended meetings or expressed interest in the past):

- Brad Cochran, Jim Coogan, Ken Crooks, Greg Gross, Tyler Kee, Chris Kirchner, Raajesh Kumar Murugesan, Guy Perreault, David Rausch, Rachel Romero, Tom Smith, Ryan Soo, Brooks Stout, and Bill Stump

### Handbook chapter planned timeline:

- Sub-committee and others to continue adding / subtracting proposed text, using “Track Changes” on the Word document posted to Basecamp yesterday, or e-mailed to Mark
- Online report on progress at the ASHRAE winter conference in Las Vegas on February 3, 2026
- March 15, 2026 final review of track changes to edited sections of the 2027 HVAC Applications Chapter 17 – Laboratories (to be uploaded to the ASHRAE Authoring Portal by April)
- Voting members of TC 9.10 to approve changes at the annual meeting in Austin on June 30, 2026

### Proposed edits already included in track changes:

- Section 1 General Design Guidance, by Chris Kirchner – info. from Chapter 3 of the Design Guide
- Section 1.2 Hazard Assessment, by Jim Coogan – Laboratory Ventilation Management Plan
- Section 1.3 Design Parameters, by Mark Malkin – laboratory suites per the IBC, and sub-ducts
- Section 4.9 Energy, by Rachel Romero (and Otto VanGeet) – various updates and I<sup>2</sup>SL reference
- Section 4.9 Energy, by Bob Weidner – energy recovery paragraph referring to RP-1780
- Section 4.10 Commissioning, by Bill Stump (and Mike Amstadt) – reference to Guideline 1.3

### Reminder of some additional text previously identified:

- Summary of maker-space considerations from Journal article – Kelley confirmed still planned
- Sequence of operations to avoid excessive pressurization – Jim Coogan (ask at annual meeting)
- Containment and monitoring of lab exhaust – Ryan confirmed it is in progress, along with chemical monitoring, to be coordinated with Greg Gross
- How to specify minimum flow rates for VAV fume hoods – Tom Smith (ask at annual meeting)

### Potential additional coordination with the Design Guide:

- Ventilation effectiveness – Bob suggested possibly asking Tom or Roland
- Lab classification – Bob suggested Tom Smith as a source for this as well
- Guideline 36 – Kelley or Christine may write a brief intro. on future intent

### And ... a call for volunteers (Answered):

- Who besides Kelley is willing to read the whole chapter before ASHRAE staff starts formatting? – Bob, Leonard, and Christine offered to help (Thank You)
- Of particular interest is to update years of references and standards which may have changed