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

(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 January 31, 2016

TC/TG/MTG/TRG TITLE Laboratory Systems

DATE OF MEETING January 29, 2016 LOCATION Orlando, FL

MEMBERS PRESENT	Term Expires	MEMBERS ABSENT	Term Expires	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Roland Charneux	2016	John Castelvecchi	2017	Traci Hanegan
James Coogan	2018	So-Yeng Chen	2016	Brad Cochran
Kelley Cramm	2017	Charles Coward	2018	Adam Bare
Carl Crow	2017	Henry Hays	2018	Wade Conlan
Carol Donovan	2018	Mark Hydeman	2018	Fred Lorch
Pete Gardner	2019	Robert Weidner	2018	Pat Carpenter
Charles Henck	2017			M Foutz
Nathan Ho	2019			B. Fullerton
Guy Perreault	2019			Raj Kapoor
David Rausch	2019			Kishor Khankari
Gaylon Richardson	2018			George Sestak
Gordon Sharp	2016			Ken Kuntz
John Varley	2016			J. Hardin
Gerhard Knutson	2017			Ken Mead
				C. Reinders
				Martin Stengl

				Erik Ballanchey
				J.L. Edmondson
				L. Le
				D. Norvell
				E. Phelps
				A.T. Gagnon
				Paul Lemester
				M. Deroo
				A Krenning
				R. Huggins

DISTRIBUTION

All Members of TC/TG/MTG/TRG plus the following:	
TAC Section Head:	Gowri Krishnam
TAC Chair:	Tom Lawrence
All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters:	Michael R. Vaughn Tara Thomas
Manager Of Standards Manager Of Research & Technical Services	Doug Reindl Michael R. Vaughn

1. **Call to Order – 3:30 pm (Roland Charneux)**
   Roland Charneux called the meeting to order. Roll call taken by Guy Perreault, 13 of 18 voting members present, 1 of 1 International non-quorum member absent, quorum established.

2. **Introductions (All)**
   All present introduced themselves and were invited to sign the attendance sheet. Those not on the sign-up sheet were asked to write in name, e-mail, and ASHRAE number (or place business card in envelop w/ ASHRAE number), and place a "Y" by their name if a YEA member.

3. **Membership Update (Guy Perreault)**
   Guy Perreault announced the old voting members rolling off and the new voting members rolling on after the summer 2016 meeting.
   Rolling off: Roland Charneux, Gordon Sharp and John Varley.
   Rolling on: Traci Hanegan, Wade Conlan, and Adam Bare.

   New leadership after the summer 2016 meeting includes:
   Traci Hanegan – Chair

Brad Cochran – Vice Chair
Guy Perreault – Secretary

4. **Approval of Previous Minutes (Roland Charneux)**
   Minutes from the Summer 2015 meeting in Atlanta were previously e-mailed.

   Kelley Cram moved move to accept minutes – Seconded by Guy Perreault; Motion passed 10-0-2 with Gaylon Richardson and John Varley abstaining.

5. **Section Head Report (Roland Charneux)**
   CEC is looking for reviewers.
   CEC will start giving strikes to people who propose conference papers/forums/seminars which are subsequently accepted and then don't end up presenting.

6. **Program Subcommittee (Carol Donovan)**
   Carol provided copies of the program subcommittee meeting minutes (see attached).
   Applications for forums and seminars for St. Louis Due February 8th.
   Track 6 – Indoor Environment: Health, Comfort and Productivity identified as being the most suited for TC9.10.
7. **Research Subcommittee Report (Mark Hydeman)**
   Mark filled in for Bob Weidner who could not make the meeting. Subcommittee minutes were provided (see attached).
   George Sestak recommended that an old research project on outflow from occupied fume hoods (conducted by Kirkpatrick at CSU) possibly be updated based on the new low flow fume hoods. ASHRAE does not appear to have a copy of the report on line, but George and Gerhard Knutson will look for copies in their records.
   There is a new Work Statement for on-line. Those RTARs moving onto Work Statement should be sure and use this new form.

   E-mail Votes since last meeting:
   RTAR 1780: Voted to Approve 17-0-0 on August 7, 2015
   Work Statement 1573: Voted to Approve 15-0-0 on January 25, 2015
8. **Handbook Subcommittee (Lou Harman)**
   No Report.
9. **Standards Subcommittee Report (Gaylon Richardson)**
   Gaylon provided copies of the Standards Subcommittee meeting minutes (see attached).
   Wade Conlan reported that there were no comments to the ASHRAE 110 Standard 2nd Public Review. As such, the new standard will be published this spring and will be on sale in St. Louis.
   There was also discussion about moving the standard to an SSPC under TC9.l10 as opposed to a Standing Committee (SPC). This will need to be addressed through ANSI.
10. **Design Guide Subcommittee (Henry Hays)**
    No report. Latest version completed and on sale.
11. **Lab Classification Subcommittee Report (Adam Bare)**
    Adam provided copies of the Standards Subcommittee meeting minutes (see attached).
    Holding monthly on-line meeting.
    Continuing to develop the definitions of each of the Chemical Safety Design Levels (CSDLs)
    The subcommittee is looking for input from EH&S professionals on how they are currently calculating the required ACH in labs.
12. **Lab Energy Efficiency Subcommittee Report (Guy Perreault)**
    Guy emailed the Lab Energy Subcommittee meeting minutes (see attached).

This is a new subcommittee, still developing mission statement.
They discussed how the subcommittee can support other TC's on energy savings opportunities for labs.
Working on developing a one page document describing energy efficiency opportunities in labs.
Erik Ballachey will take over as the subcommittee chair.

13. **Journal (Roland Charneux)**
No lab related Journal articles since last meeting.
14. **Laboratory Design Course (John Varley)**
Course was presented on Sunday afternoon to a full house. John also presented the course via a webinar in the fall and is looking to do so again in the spring.
Looking to add two additional courses – Controls (Jim Coogan and John Castelvecchi) and Exhaust stack design (Brad Cochran).
15. **Liaison Reports**
    a. **TC1.4 – Control Theory & Application (Jim Coogan)**
    Writing a guideline on the development of Sequence of Operations.
    Should be available for public review in a few months.
    b. **TC2.2 – Plant and Animal Environment (David Rausch)**
    RTAR on energy use in AG buildings
    c. **TC4.3 – Ventilation and Infiltration (Brad Cochran)**
    Rejection of RTAR 1776 – will address comments w/ RAC.
    d. **TC 4.10 – Indoor Environmental Modeling ()**
    None
    e. **TC 5.1 – Fan Systems (Brent Fullerton?)**
    Moving forward with the DOE fan efficiency regulations, induced flow fans will not be part of the regulation.
    f. **TC 5.3 – Roof Air Distribution (Fred Lorch)**
    Agreed to co-sponsor a seminar on fan coil units and chilled beams.
    g. **TC 5.8 – Industrial Ventilation (Ken Mead)**
    Agreed to co-sponsor RTAR 1573 on the determination of a suitable replacement for SF_6.
    h. **TC 7.6 – Building Energy Performance ()**
    None
    i. **TC 7.7 – TAB (Gaylon Richardson)**
    Cognizant on Guideline 11 on HVAC controls appendix addressing control sequences showing various types of systems and how they are tested. Air Balance Council to have a new standard out in the February that will include a whole chapter on labs and hospitals addressing how to specify control sequences.
    j. **TC 7.9 – Commissioning (Wade Conlan)**
    Still working on getting organized.
    k. **TC 9.2 – Industrial Air Conditioning (Bill Kumpf)**
    None
    l. **TC 9.6 – Healthcare (Traci Hanegan)**
    Handbook subcommittee working on the next update to redo the pharmacy section based on USP 800. Edits due back by 1st of May.
    m. **TC 9.11 – Cleanspaces (Kishor Khankari)**
    New RTAR on pressure automation. Energy efficiency subcommittee completing first draft of a white paper on current status of energy efficiency in clean spaces; should be ready for review in St. Louis. Committee is planning on doing a series of white papers on clean room energy efficiency.
    n. **62.1 – Ventilation for IAQ (Nathan Ho)**

The committee is under new leadership, being restructured. Possible correlation with Adam's committee on ACH.

o. **90.1 – Energy Efficiency (Mark Hydeman)**
   None
p. **SMACNA**
   None
q. **NFPA 45 (David Rausch)**
   2015 edition released the past year, and is not open for comment.
r. **NSF (Frank Spevak)**
   None
s. **ISPE (Pete Gardner)**
   Published sustainability guide w/ European perspective.
t. **AIHA Z9.5 (Gordon Sharp)**
   See standards subcommittee report
u. **I2SL (Gordon Sharp)**
   See standards subcommittee report

16. **Old Business (Roland Charneux / Traci Hanegan)**
    None
17. **New Business (Roland Charneux / Traci Hanegan)**
    George Sestake thanked the committee for the portrait of everyone attending the Atlanta meeting. George also mentioned that there are not a lot of awards won by members of TC9.10, but many who are qualified. As such, he would like to chair an awards committee for TC9.10. Members should e-mail George any awards they have currently received from ASHRAE.

18. **Status of TC (Roland Charneux / Traci Hanegan)**
    Kishor was honored as an ASHRAE Fellow.
    Thank you to Fred Lorch for 40 years of service to ASHRAE.
    Jim Coogan mentioned that ASHRAE has re-built the we-site, including a new mobile version. It is now easier to update and can include copies of the seminars (slide show only).
19. **Meeting Evaluation Priorities and Assignments (Roland Charneux)**
    None
20. **Adjourn 4:52 p.m.**

ASHRAE TC 9.10
Programs Subcommittee
Orlando Winter Conference
January 23rd – January 27th, 2016
Sunday 4:30 – 5:15
Lake Monroe

2016 Winter Conference, Jan 23-27, Orlando

No.	Type	Title	Chair/Back-up	Abstract Submitted
1	Short Course Sunday 3:30-6:30	Laboratory Design: The Basics and Beyond	John Varley	
2	Forum 2 Monday 11-12:00	Air Change Rates: Friend or Foe TC-9.11, 9.06, 9.10	Kishor Khankari	

2016 Summer Conference, June 25-29, St. Louis, MO.

The ASHRAE 2016 Annual Conference will take place in St. Louis, MO, at the America's Center Convention Complex and Renaissance St. Louis Grand Hotel, June 25-29, 2016. The 2016 ASHRAE Annual Conference will attract some 2,500 attendees and meeting participants.

- Final Conference Papers due January 4, 2016.
- Conference Paper Accept/Revise/Reject Notifications due January 26, 2015.
- Seminar, Forum and Workshop Proposals due February 8, 2016.
- Seminar, Forum and Workshop Accept/Reject Notifications due March 23, 2016.

Speaker Registration Fee

For the 2016 Annual Conference in St. Louis, Speaker registration fees and policies will apply. Speakers will receive a 75% discount off the regular conference registration. Authors are required to attend the conference to present their papers in order for their papers to be published.

St. Louis, MO TRACKS:

- **Track 1: Advances in Refrigeration Systems and Alternative Refrigerants**
  This track seeks papers and programs that explore the wide range of refrigeration systems under development with special emphasis on the use of alternative refrigerants in vapor compression machines to address environmental concerns.

- **Track 2: Research Summit**
  The fourth annual Research Summit seeks papers that report results on any aspect of ASHRAE-related research including heating, cooling, ventilation, other energy uses in the engineered environment and associated environmental aspects.

- **Track 3: Fundamentals and Applications**
  Fundamental information and applications of fundamentals related to all aspects of HVAC&R are welcome. This can range from psychrometric properties and processes to combustion, controls, HVAC system and envelope fundamentals and beyond.

- **Track 4: HVAC Systems and Equipment**
  This track will include presentations on best practices to implement traditional, non-traditional, and hybrid approaches to achieve successful HVAC&R systems design. Objectives include high performance systems and equipment, LEED certified designs and sustainable buildings.

- **Track 5: Smart Building Systems/Remote Monitoring and Diagnostics**
  Smart buildings address HVAC&R equipment operation (chiller sequencing, soft start), integration into complete systems and can potentially interface with multiple building complexes and micro grid operation. This track includes papers on advanced communication protocols, system integration, BMS tools, data management and analysis.

- **Track 6: Indoor Environment: Health, Comfort, Productivity**
  Buildings and other enclosed spaces are increasingly required to provide safe, healthy environments in an energy efficient manner. Papers in this track will review the balance between environmental health and energy efficiency in buildings and help define future education, policy and research directions.

- **Track 7: Professional Skills Beyond Engineering**
  This track seeks to ensure professional skills are bing developed and maintained beyond engineering essentials. Emphasis will be placed on meeting the professional development and business needs of today and converting them into the building blocks of tomorrow's success.

- **Track 8: Renewable Energy Systems and Net Zero Buildings**
  Wind, hydroelectric and solar are just a few of the alternative and/or renewable energy sources that are being used in HVAC design as we strive for Net-zero and high efficiency buildings. This track will address recent advances in alternative energy systems and equipment and new design strategies for achieving Net-zero buildings.

Conference Program Chair: Tom Kuehn
Email: kuehn001@umn.edu

St. Louis Program Ideas

No.	Type	Title	Chair/Back-up	Abstract Submitted
1	Seminar, 2-3 speakers	Lab Renovations- Case Study	Dave Rausch Gary Cooper -	
2	Seminar,	Vivarium – ACH/environmental parameters, Renovation		
		Demand Control Ventilation – Slashing energy use in vivarium	Gordon Sharp	
		Case Study of DCV in Japan	Masaya Ishihara	
3	Seminar, 2-3 speakers	Labs – Air Change Effectiveness (TC 5.3 – Std 129)	Smith	

4	Seminar, 2-3 speakers	Comparison of Fancoil Units and Chilled Beams (TC 5.3) – Gus fems and Jerry sipes, One more for design	Gaylon Richardson/ Jason Atkinson -
5	Paper Session, 2-3 speakers	Test Procedures for Lab Controls Results from Manufacturers	Mark Hydeman, Gaylon Richardson

Future ASHRAE CONFERENCES

Year	Winter	Annual
2017	2017 Jan 28-Feb 1 – Las Vegas	Jun 24-28 – Long Beach, CA
2018	2018 Jan 20-Jan 24 – Chicago, IL	Jun 23-27 – Houston, TX

TC-9.10 Standards Sub-committee meeting

15 persons were present

Roland Charneux, Ken Kuntz, Pete Gardner , Eric Ballachey, Rob Chopowick, Jake Edmondson, Jim Coogan, Jason Atkinson, George Sestak, Harris Sheinman, Matt Gaedtler, Fred Lorch, Lloyd Le, John Garrett Neubauer, Gaylon Richardson

Standard 90.1

No Report

ASHRAE 110

Wade Conlan reported the public review had no comments

Standard 62.1

Nothing new to report. Addendum « k » on fume hood air classified as 4 unless E H&S officer is actually specifying another class.

ASSE Z-9.5

Under revision. Next publication will be in 2017. It is the right time to comment. Tom Smith, Brad Cochran, Jim Coogan, Gordon Sharp and Victor Newman are part of the committee. Jim is trying to have the committee meet during the ASHRAE meeting

I2SL

Tom and Gordon are on the board ofI2SL. I2SL has made a survey of the knowledge of HVAC maintenance people that operates lab building. It seems that the systems complexity outpaced the competence of the maintenance people. I2SL is preparing training for these people. There could be collaborration between I2SL and ASHRAE ALI. Tom will discuss this with Kelley Cramm. I2SL also made a survey to see what should be adde to the lab benchmarking tool. No updates

Standard 170 2013

Addendum « c » was released in August 2014 which discusses demand control ventilation for labs in Healthcare and also air change rates.

ASHRAE RESEARCH Committee Meeting - Orlando 2016

TC9.10 LABORATORIES - RESEARCH ACTIVITY LIST 6/30/2015

DOCUMENT TYPE	MORTS NUMBER	DOCUMENT TITLE	CO-SPONSOR	PROJECT COST	AUTHOR	AUTHOR E-MAIL & TELEPHONE	STATUS	ACTION ITEMS	DUE DATES	1/24/16 Research & TC Meeting Comments
RTAR	**1573**	Determination of Suitable Replacement for SF_6 When Used As a Tracer Gas In Accordance With ANSI/ASHRAE Standard 110	**TC 5.8**	$125,000	M. HYDEMAN	mark.hydeman@continual.net	***Final Preparation for RAC; TC 9.10 approved work statement by electonic vote; TC 5.8 agreed to co-sponsor work statement by electronic vote.***	***Complete RAC Cover Sheet and subbmit to RAC.***	***January 2016***	See comments below
RTAR	***1780***	***Test Method to Evaluate Cross Contamination of Gaseous Contaminant within Total Energy Recovery Devices***	**TC 2.3**	TBD	Roland C.	rcharneux@pageaumorel.com	***Roland updated RTAR including title and it was approved by TC9.10 and co-sponsor TC 2.3. Need to respons to RAC comments***	***Respond to RAC comments and move forward to work statement.***	***TBD***	See comments below
RTAR	TBD	Validation of Plume Dispursion Models	**TC 9.10**		Brad Cochran	bcochran@cppwind.com	***TC 9.10 email voted to approve this RTAR; TC 4.3 is Sponsoring the RTAR. TC9.10 to Co-Sponsor. Awaiting Feedback from TC 4.3.***		***Orlando***	See comments below
RTAR	TBD	***Defining and characterization of air-change effectiveness in labs.***	***TC 9.6, TC 9.10***	TBD	Tom Smith	tcsmith@labhoodpro.com		***Tom to prepare RTAR in preparation for vote in Orlando***	***Atlanta***	See comments below

Research Subcommittee Meeting Discussion - 6-28-15 with updates from TC9.10 Meeting

1573: Mark H. finalized work statement including all review comments. Need to finalize work statement cover sheet and submit to RAC at Winter meeting.

1780: Get RAC comments on RTAR from RAC to move forward with work statement.

Validation of Fume Hood Dispersion Models: RTAR was submitted by Brad for approval. RTAR is being co-sponsored by TC 9.10 and sponsored by TC 4.3. Awaiting feedback on review.

Defining and Characterizing Air Change Effectiveness in Labs: Tom Smith will be writing RTAR. Anticipated for Jan 2016 - Orlando. Biggest issue was confirming title: Air Change Effectiveness vs. Ventilation Effectiveness vs. Purge Effectiveness.

The next three RTAR & WS submission deadlines are as follows:

8/15/15 – RAC Fall Meeting Review (Sep. - Oct. Timeframe)

12/15/15 – RAC Winter Meeting Review (Jan. - Feb. Timeframe)

5/15/16 - RAC Winter Meeting Review (Jun. - Jul. Timeframe)

ASHRAE TC 9.10
Lab Classification Subcommittee Meeting
Orlando Winter Conference
Sunday, January 24th, 2016
5:15 – 7:00 p.m.

Agenda:

1. Introductions

2. Recap of recent activities:
    - Several online meetings: ASHRAE, AIHA EH&S, ACS CCS
    - Review most recent meeting minutes

3. Open discussion:
    - CSDL table
    - Draft outline for proposed guideline
    - Other?

4. Next steps
    - Resolve open issues with CSDL tables
    - Proposed guideline
        - Finalize outline
        - Assign responsible parties for each section
        - Begin drafting sections
    - Next online meeting Monday, February 1st, at 2:00pm EST

ASHRAE TC 9.10
Lab Classification Subcommittee Online Meeting
January 4th, 2016
2:00 – 3:00 p.m. (EST)

Meeting minutes:

Attendees:

Adam Bare	ASHRAE TC 9.10
Roland Charneaux	ASHRAE TC 9.10
Guy Perreault	ASHRAE TC 9.10
Chuck Howard	ASHRAE TC 9.10
Jim Coogan	ASHRAE TC 9.10 & AIHA LHSC
Elizabeth Kolacki	ASHRAE TC 9.10
Debbie Decker	AIHA LHSC
Gary Goodson	ASHRAE TC 9.10
Tom Smith	ASHRAE TC 9.10 & AIHA LHSC
Peter Slinn	

1. Reviewed the recent CSDL table revisions. See attached mark-ups from the meeting.

2. Reviewed the draft outline for the proposed guideline. See attached mark-ups.

3. Next steps
    - Continue to review and comment on the CSDL table
    - Review and comment on the draft outline
    - Start drafting language for the proposed guideline
    - Next meeting: Sunday, January 24th, 5:15pm EST (in Orlando)

Chemical Safety Design Levels (CSDLs)

Recommended Design Criteria

ITEM #	DESIGN CRITERION	CSDL-0 REQUIREMENTS	CSDL-1 REQUIREMENTS	CSDL-2 REQUIREMENTS	CSDL-3 REQUIREMENTS	CSDL-4 REQUIREMENTS
Laboratory Concept Description						
Description	Chemistry Expected To Be Conducted In This Setting	Use of small containers of volatile reagent chemicals (500 ml or less), pre-packaged kits, or consumer chemicals as specified on the manufacturer's label.	Use of volatile chemicals for which dilution is an acceptable control strategy.	Use of volatile chemicals where local exhaust or ventilated enclosures may be used for point sources. During use, overexposures due to inadequate air changes or inadequate mixing are not a concern. Some dilution and exchange of lab air by the general ventilation system is necessary to prevent flammable vapor buildup in the space. Therefore, general ventilation air exchange rates should be considered in terms of the potential for fugitive chemical emissions. GHS Codes that might apply: H334 & H335, and H226 & H227 in small quantities, all restricted to local exhaust areas. No significant sources on the laboratory bench.	Use of volatile chemicals which require use of local ventilation, such as fume hoods, to maintain safe and healthful working conditions. During use, operations without local exhaust ventilation may present a concern of overexposures due to inadequate air changes or inadequate mixing of the general ventilation system. GHS Codes that might apply: H224, H225, H226, H304, H331, & H332.	Use of high hazard chemicals and/or volatile chemicals in volumes which require specific engineering designs. During use, overexposures due to inadequate air changes or inadequate mixing from the general ventilation system is a concern. Dilution and exchange of lab air is necessary to prevent flammable vapor or airborne toxic chemical buildup in space. GHS Codes that might apply: H331 & H332.
Examples	Types of laboratories included in this group	• Temperature controlled rooms (warm rooms and cold rooms), • demonstration rooms with single experiments of less than 5 grams or 100 ml • computer labs	• Class laboratories with multiple concurrent experiments with small quantities (<100 ml) of volatile reagent chemicals • Shop areas with consumer chemicals used and equipment emissions controlled by local exhaust • Biological laboratories with no volatile chemical use beyond disinfectants	• Laboratories with containers of more than 500 ml of volatile chemicals in storage or use • Laboratories that contain a limited number of fume hoods, and/or limited use of local exhaust	Laboratories requiring fume hoods or local exhaust associated with specific equipment	Laboratories requiring specific safety analysis and devices to support the work, such as nanomaterials laboratories, radioactive chemicals laboratories
Air Recirculation Considerations						
1	Air Recirculation Within the Same Space is Permissible (by use of Supplemental Space Recirculation Units)	Yes	Yes, where permitted by Std. 62.1 (for Class I, II or III air). Confirm system compatibility (e.g., materials compatibility, potential equipment corrosion, equipment accessibility, reactivity with cooling coil condensation, etc.).	Same requirements as for CSDL-1	Same requirements as for CSDL-1	No

Recommended Design Criteria

ITEM #	DESIGN CRITERION	CSDL-0 REQUIREMENTS	CSDL-1 REQUIREMENTS	CSDL-2 REQUIREMENTS	CSDL-3 REQUIREMENTS	CSDL-4 REQUIREMENTS
2	Enthalpy Wheels Permitted	Yes, where permitted by Std 62.1. Limit carryover per Std. 62.1 for the Class I air.	Same requirements as for CSDL-0	Same requirements as for CSDL-0	Yes, if proven to be appropriate by hazard analysis. Limit carryover per Std. 62.1 for the applicable air classification.	No
3	Air Recirculation at a Central Air Handling System is Permissable (where the system serves more than one space)	Yes, where permitted by Std. 62.1 (for Class I or II air only). Requires review and approval by an environmental health and safety professional.	No	No	No	No

Recommended Design Criteria

ITEM #	DESIGN CRITERION	CSDL-0 REQUIREMENTS	CSDL-1 REQUIREMENTS	CSDL-2 REQUIREMENTS	CSDL-3 REQUIREMENTS	CSDL-4 REQUIREMENTS
Supply & Exhaust Airflow Requirements						
4	Occupied Minimum Exhaust Ventilation Rate (one-pass air)	Standard 62.1	Same requirements as for CSDL-0	4-6 air changes based on sufficient information for hazard review by an EH&S professional and completion of review. General ventilation rate may be lower if validation of effectiveness of ventilation suggests sufficient dilution.	If all emission sources of concern are contained by use of local exhaust ventilation, and inadequate air distribution or mixing from the general ventilation system is not a concern: • Typically 6* air changes per hour, otherwise: • Typically 8* air changes per hour. * Scale minimum air change rates upward based on project-specific analysis. Technologies such as indoor air quality sensing can be used to support the results of this analysis.	If all emission sources of concern are contained by use of local exhaust ventilation, and inadequate air distribution or mixing from the general ventilation system is not a concern: • Typically 8* air changes per hour, otherwise: • Typically 10* air changes per hour. * Scale minimum air change rates upward based on project-specific analysis. Technologies such as indoor air quality sensing can be used to support the results of this analysis.
5	Unoccupied Minimum Exhaust Ventilation Rate (one-pass air)	Standard 62.1 (for unoccupied conditions)	Same requirements as for CSDL-0	Same requirements as for CSDL-0	Typically 4* air changes per hour. *Scale minimum air change rate upward or downward based on project-specific analysis. Technologies such as indoor air quality sensing can be used to support the results of this analysis.	Same requirements as for CSDL-3
6	Evaluation/Confirmation of Room Ventilation Effectiveness	Using standard design practice, evaluate supply and return/exhaust devices locations and types, so as to provide adequate mixing of supply air with room air, and prevent stratification.	Same requirements as for CSDL-0	Same requirements as for CSDL-0	Same requirements as for CSDL-0	In addition to the requirements for CSDL-0, verify room ventilation effectiveness via dispersion modeling or physical measurements
11	Consider Continuous Indoor Air Quality Monitoring	If specific volatile chemicals of concern are identified (for example, O2 levels in temperature control rooms)	No	No	When specific volatile contaminants of concern are identified	As specified by project requirements
13	Exhaust Air Filtration or Treatment	Not applicable	No	No	No	To Be Considered in specific situations

Recommended Design Criteria

ITEM #	DESIGN CRITERION	CSDL-0 REQUIREMENTS	CSDL-1 REQUIREMENTS	CSDL-2 REQUIREMENTS	CSDL-3 REQUIREMENTS	CSDL-4 REQUIREMENTS
14	Spark Protection And Explosion Proof Exhaust Fans	Not applicable	For local exhaust systems	For local exhaust systems	For local exhaust systems	To Be Considered in specific situations
15	Duct Materials	Not applicable	Verify Fume Hoods and Exhaust Duct Materials Are Appropriate	Verify Fume Hoods and Exhaust Duct Materials Are Appropriate	Verify Fume Hoods and Exhaust Duct Materials Are Appropriate	Verify all ventilation elements are appropriate
16	Ventilation Diversity Factor	Not a factor	Factor to be considered	Factor to be considered	Factor to be considered	Should not be considered
17	Cooling Diversity Factor	Not a factor	Factor to be considered	Factor to be considered	Factor to be considered	Should not be considered
18	Heating Diversity Factor	Not a factor	Factor to be considered	Factor to be considered	Factor to be considered	Should not be considered
19	Exhaust Capture Velocities	Not applicable	Hood face velocities will be based on capture criteria	Hood face velocities will be based on capture criteria	Hood face velocities will be based on capture criteria	Equipment specific

Chemical Safety Design Levels (CSDLs)

Recommended Design Criteria

ITEM #	DESIGN CRITERION	CSDL-0 REQUIREMENTS	CSDL-1 REQUIREMENTS	CSDL-2 REQUIREMENTS	CSDL-3 REQUIREMENTS	CSDL-4 REQUIREMENTS
Equipment Reliability						
20	Equipment Redundancy	No	No	No	Yes- Exhaust And Supply Air To Have Multiple Components, But Doesn't Have To Be N+1	Yes- Exhaust And Supply Air To Be N+1
21	Manifolding Permitted	Yes	Yes	Yes	Yes	Yes, If Chemical Compatibility Is Verified.
22	Emergency Power	Nothing Beyond Life Safety requirements	Nothing Beyond Life Safety requirements	Nothing Beyond Life Safety requirements	Life Safety requirements, plus: • Fume hood exhaust air should be considered. • Minimum lighting levels on the lab bench should be considered.	CSDL-3 requirements, plus: • General exhaust air should be considered. • Supply air should be considered, in order to prevent excessive negative pressurization.
Computational Fluid Dynamics (CFD) Modeling Requirements						
25	Dispersion modeling to assess building re-entrainment	No	No	No	Yes	Yes
Controls Requirements						
26	Variable Air Volume Permitted	Yes	Yes	Yes. Constant volume fume hood exhaust should be considered. For variable volume fume hood exhaust, minimum duct velocities should be considered.	Same as CSDL-2	CSDL-3 requirements, plus the supply and exhaust systems shall be capable of operating in a constant volume mode during an event.
27	Differential Pressure or Air Volume Offset Control	Not required	Control required during emergency mode of operation only (where applicable)	Control required during normal mode of operation	Same as CSDL-2	Same as CSDL-2, plus minimum differential pressure of 0.01" wg.
28	Not used					
29	Ventilation Parameters Monitoring (e.g., exhaust airflow, differential pressure, air volume offset, etc.)	Alarm when any monitored laboratory conditions are outside their respective acceptable ranges	Same as CSDL-0	Same as CSDL-0, plus provide local alarms for fume hoods. • Provide local alarms for fume hoods. • Provide continuous monitoring of laboratory exhaust airflow.	Same as CSDL-2, plus consider monitoring laboratory differential pressure.	Same as CSDL-3, plus: • Provide continuous monitoring of laboratory differential pressure. • Consider local audible and/or visual alarms for laboratory exhaust airflow and/or differential pressure.
30	Not used					
32	Not used					
33	Trending Reports Capability	N/A	No	Required	Same as CSDL-2	Same as CSDL-2
34	Emergency Purge Mode	Not required	Not required	Should be considered	Same as CSDL-2	Same as CSDL-2

Recommended Design Criteria

ITEM #	DESIGN CRITERION	CSDL-0 REQUIREMENTS	CSDL-1 REQUIREMENTS	CSDL-2 REQUIREMENTS	CSDL-3 REQUIREMENTS	CSDL-4 REQUIREMENTS
General Laboratory Requirements						
35	Management of Change	Potential for increase in chemical use to CSDL-1 is unlikely, but possible with significant changes to the ventilation system design.	Potential for increase in chemical use to CSDL-2 is unlikely, but possible with significant changes to the ventilation system design.	Potential for increase in chemical use to CSDL-3 is unlikely, but possible. Ventilation requirements should be increased to 6-8 ACH should space use changes to CSDL-3 or 4 occur. If there is potential for this increase, capacity of the air handling systems must be considered.	Potential for increase in chemical use to CSDL-4 is unlikely, but possible with significant changes to the ventilation system design. Ventilation requirement should be increased to 8-10 ACH should space use changes to CSDL-4 occur, which would require a safety analysis.	Changes to laboratory require a safety analysis.
37	Failure Mode Analysis	Not required	Not required	Not required	Perform failure mode analysis for the following conditions, at a minimum: • Exhaust system failure. • Loss of normal power, and operations during use of standby power. • Loss of laboratory supply or make-up air. • Loss of laboratory differential pressure. • Activation of general building fire alarm.	Same as CSDL-3
36	Building/Room Tightness	Same As General Office Construction	Same As General Office Construction	Same As General Office Construction	Compartmentalization For Proper Pressure/Airflow Control	Same As CSDL-2, plus add vestibules to improve pressurization controls
37	Operable Windows To Outside permitted?	Yes	Yes	Yes	No	No
38	Signage within room	Yes CSDL-0 required	Yes CSDL-1 required	Yes CSDL-2 required	Yes CSDL-3 required	Yes CSDL-4 required
39	Vestibule Required	No	No	No	No	Yes
40	Testing And Certification of operating parameters required	Laboratory temperature	Laboratory temperature and flow rates; control system operation; fume hood containment	Laboratory temperature and flow rates; control system operation; fume hood containment	Laboratory temperature and flow rates; control system operation; fume hood containment	Laboratory temperature and flow rates; control system operation; fume hood containment
41	Documentation	Yes, including equipment operating manuals	Yes, including equipment operating manuals, commissioning reports and fume hood containment testing	Yes, including equipment operating manuals, commissioning reports and fume hood containment testing	Yes, including equipment operating manuals, commissioning reports and fume hood containment testing	Yes, including equipment operating manuals, commissioning reports and fume hood and other ventilation equipment containment testing

Recommended Design Criteria

ITEM #	DESIGN CRITERION	CSDL-0 REQUIREMENTS	CSDL-1 REQUIREMENTS	CSDL-2 REQUIREMENTS	CSDL-3 REQUIREMENTS	CSDL-4 REQUIREMENTS
42	Commissioning	Yes	Yes	Yes	Yes	Yes
43	Site Specific Emergency Procedures Defined	No	No	Yes	Yes	Yes
Other						
43	# Of Bench top Fume Hoods Per Lab Module	None	1 per laboratory space with limited use and allowable chemicals	1-6' / 250/SF	1-6' / 250/SF	As required by use
44	Local Exhaust	None allowed	None allowed	Yes, has to be properly engineered to work with a Variable Air Volume system	Yes, has to be properly engineered to work with a Variable Air Volume system	Yes
45	Radioactive Material Use Permitted?	No	No	No	Yes, with risk review	Yes, with risk review
46	Nano Materials	No	No	No	Yes, with risk review	Yes, with risk review
47	Specialty Fume Hoods	None	None	None	1	Any

ASHRAE TC 9.10 – Laboratory Systems
Lab Classification Subcommittee

Guideline for Safe Design of Chemical Laboratories

Outline

I. Foreword

Laboratory safety is the inviolable constraint. No requirements should be implemented without a laboratory safety risk analysis. This guideline provides minimum recommendations only, and does not replace the intent of the risk analysis.

II. Introduction
   A. Scope
   B. Key Definitions
   C. Related Work by Other Organizations
   D. Application
      1) Laboratory Safety Risk Analysis
      2) GHS Codes & The Screening Process
      3) Determining Minimum Air Change Rates
      4) Managing Changes in Laboratory Use/Function

III. Chemical Safety Design Levels
   A. Descriptions & Examples
   B. Recommended Design Criteria

IV. Summary

ASHRAE TC 9.10 – Laboratory Systems Lab Classification Subcommittee

Mission Statement

The ASHRAE TC 9.10 Laboratory Classification Subcommittee, in association with other organizations (including the AIHA Laboratory Health and Safety Committee and the ACS Division of Chemical Health and Safety), is developing a design standard that describes the facility engineering features appropriate to support safe management of chemical processes at the lab scale, as defined by OSHA. The primary objective of this standard is to assist in the identification of best practices for design of laboratory ventilation systems to support safe chemical use while providing cost effective, sustainable facilities.

It is recognized by the Subcommittee that the application of this guideline will require specific risk assessments for the chemistry being proposed for the space. In cases when this information is not available, reasonable descriptions of the type of work expected to be done in the space will be provided to the design team. Before chemical work is begun in these spaces, specific review of the work to be conducted will be required to determine whether it meets the assumptions associated with the project planning and construction process.

This Subcommittee's effort will be limited to issues related to heating, ventilating and air conditioning systems. It does not seek to duplicate work that is under the purview of other ASHRAE committees or other organizations, such as evaluation of fume hood containment (currently covered by the ASHRAE Standard 110) or overall environmental impacts of lab facilities (currently covered by the LEED program, ASHRAE Standard 90.1, and other standards and guidelines) are not part of the scope of this effort.

The first step in this process will be to evaluate the feasibility of developing such a standard, and whether a "Laboratory Safety Design Level" system similar to the Biosafety Level system can be developed. In addition to the determination of design criteria, such an effort will require a risk assessment protocol as well as a management of change component. These considerations are the reason for the cross-disciplinary nature of this effort.

While there are similarities between this effort and the NIH's Biosafety Level designations, we recognize that there are significant differences between chemical hazards and biohazards that present special challenges to this Subcommittee's work. Specifically, biological agents are of concern for their health hazards only. Conversely, the GHS system for classifying chemical hazards identifies 9 classes of chemical hazards, including both physical and health hazards; management strategies for some of these hazards appropriately include general ventilation requirements, whereas strategies for others do not. However, we believe that general guidelines for chemical laboratory design will prove valuable to the laboratory community by assisting in clarifying the

expectations of the many stakeholders involved in the design and operation of laboratories, and the use of hazardous chemicals therein, while also helping to reduce first costs and energy usage.

Key definitions:

Emergencies: situations in which chemicals are released in amounts or at rates that are beyond those planned for in the laboratory design process. These situations require extraordinary action in order return them to design conditions. It is expected that the primary emergency response strategy will be evacuation of laboratory workers and response by teams equipped with respiratory protection.

Laboratories: workplaces in which the chemical use meets OSHA's definition of *laboratory scale*; that is chemical are used in amounts that are readily manipulated by a single, trained person. Laboratory scale means work with substances in which the containers used… are designed to be easily and safely manipulated by one person. "Laboratory scale" excludes those workplaces whose function is to produce commercial quantities of materials.

Ventilation effectiveness: Ventilation effectiveness is the ability of the ventilation system to deliver specific air exchanges rates throughout the laboratory. The effective ventilation rate for a laboratory will be the lowest exchange rate found in the space, either through physical assessment or Computational Fluid Dynamics. The design goal for a laboratory will be the entire laboratory room be within 20% of the overall air exchange rate for the room, in order for the laboratory workers to work as expected in the room.

Volatile chemicals: Volatile chemicals are liquids and solids that evaporate at potentially hazardous rates, either through evaporation of the chemical or through products of expected reactions, into the workplace during planned use.

ASHRAE TC 9.10
Lab Classification Subcommittee Meeting
Orlando Winter Conference
Sunday, January 24th, 2016
5:15 – 7:00 p.m.

Agenda:

1. Introductions

2. Recap of recent activities:
    - Several online meetings: ASHRAE, AIHA EH&S, ACS CCS
    - Review most recent meeting minutes

3. Open discussion:
    - CSDL table
    - Draft outline for proposed guideline
    - Other?

4. Next steps
    - Resolve open issues with CSDL tables
    - Proposed guideline
        - Finalize outline
        - Assign responsible parties for each section
        - Begin drafting sections
    - Next online meeting Monday, February 1st, at 2:00pm EST

ASHRAE TC 9.10
Lab Classification Subcommittee Online Meeting
January 4th, 2016
2:00 – 3:00 p.m. (EST)

Meeting minutes:

Attendees:

Adam Bare	ASHRAE TC 9.10
Roland Charneaux	ASHRAE TC 9.10
Guy Perreault	ASHRAE TC 9.10
Chuck Howard	ASHRAE TC 9.10
Jim Coogan	ASHRAE TC 9.10 & AIHA LHSC
Elizabeth Kolacki	ASHRAE TC 9.10
Debbie Decker	AIHA LHSC
Gary Goodson	ASHRAE TC 9.10
Tom Smith	ASHRAE TC 9.10 & AIHA LHSC
Peter Slinn	

1. Reviewed the recent CSDL table revisions. See attached mark-ups from the meeting.

2. Reviewed the draft outline for the proposed guideline. See attached mark-ups.

3. Next steps
    - Continue to review and comment on the CSDL table
    - Review and comment on the draft outline
    - Start drafting language for the proposed guideline
    - Next meeting: Sunday, January 24th, 5:15pm EST (in Orlando)

Chemical Safety Design Levels (CSDLs)

Recommended Design Criteria

ITEM #	DESIGN CRITERION	CSDL-0 REQUIREMENTS	CSDL-1 REQUIREMENTS	CSDL-2 REQUIREMENTS	CSDL-3 REQUIREMENTS	CSDL-4 REQUIREMENTS
Laboratory Concept Description						
Description	Chemistry Expected To Be Conducted In This Setting	Use of small containers of volatile reagent chemicals (500 ml or less), pre-packaged kits, or consumer chemicals as specified on the manufacturer's label.	Use of volatile chemicals for which dilution is an acceptable control strategy.	Use of volatile chemicals where local exhaust or ventilated enclosures may be used for point sources. During use, overexposures due to inadequate air changes or inadequate mixing are not a concern. Some dilution and exchange of lab air by the general ventilation system is necessary to prevent flammable vapor buildup in the space. Therefore, general ventilation air exchange rates should be considered in terms of the potential for fugitive chemical emissions. GHS Codes that might apply: H334 & H335, and H226 & H227 in small quantities, all restricted to local exhaust areas. No significant sources on the laboratory bench.	Use of volatile chemicals which require use of local ventilation, such as fume hoods, to maintain safe and healthful working conditions. During use, operations without local exhaust ventilation may present a concern of overexposures due to inadequate air changes or inadequate mixing of the general ventilation system. GHS Codes that might apply: H224, H225, H226, H304, H331, & H332.	Use of high hazard chemicals and/or volatile chemicals in volumes which require specific engineering designs. During use, overexposures due to inadequate air changes or inadequate mixing from the general ventilation system is a concern. Dilution and exchange of lab air is necessary to prevent flammable vapor or airborne toxic chemical buildup in space. GHS Codes that might apply: H331 & H332.
Examples	Types of laboratories included in this group	• Temperature controlled rooms (warm rooms and cold rooms), • demonstration rooms with single experiments of less than 5 grams or 100 ml • computer labs	• Class laboratories with multiple concurrent experiments with small quantities (<100 ml) of volatile reagent chemicals • Shop areas with consumer chemicals used and equipment emissions controlled by local exhaust • Biological laboratories with no volatile chemical use beyond disinfectants	• Laboratories with containers of more than 500 ml of volatile chemicals in storage or use • Laboratories that contain a limited number of fume hoods, and/or limited use of local exhaust	Laboratories requiring fume hoods or local exhaust associated with specific equipment	Laboratories requiring specific safety analysis and devices to support the work, such as nanomaterials laboratories, radioactive chemicals laboratories
Air Recirculation Considerations						
1	Air Recirculation Within the Same Space is Permissible (by use of Supplemental Space Recirculation Units)	Yes	Yes, where permitted by Std. 62.1 (for Class I, II or III air). Confirm system compatibility (e.g., materials compatibility, potential equipment corrosion, equipment accessibility, reactivity with cooling coil condensation, etc.).	Same requirements as for CSDL-1	Same requirements as for CSDL-1	No

Recommended Design Criteria

ITEM #	DESIGN CRITERION	CSDL-0 REQUIREMENTS	CSDL-1 REQUIREMENTS	CSDL-2 REQUIREMENTS	CSDL-3 REQUIREMENTS	CSDL-4 REQUIREMENTS
2	Enthalpy Wheels Permitted	Yes, where permitted by Std 62.1. Limit carryover per Std. 62.1 for the Class I air.	Same requirements as for CSDL-0	Same requirements as for CSDL-0	Yes, if proven to be appropriate by hazard analysis. Limit carryover per Std. 62.1 for the applicable air classification.	No
3	Air Recirculation at a Central Air Handling System is Permissable (where the system serves more than one space)	Yes, where permitted by Std. 62.1 (for Class I or II air only). Requires review and approval by an environmental health and safety professional.	No	No	No	No

Recommended Design Criteria

ITEM #	DESIGN CRITERION	CSDL-0 REQUIREMENTS	CSDL-1 REQUIREMENTS	CSDL-2 REQUIREMENTS	CSDL-3 REQUIREMENTS	CSDL-4 REQUIREMENTS
Supply & Exhaust Airflow Requirements						
4	Occupied Minimum Exhaust Ventilation Rate (one-pass air)	Standard 62.1	Same requirements as for CSDL-0	4-6 air changes based on sufficient information for hazard review by an EH&S professional and completion of review. General ventilation rate may be lower if validation of effectiveness of ventilation suggests sufficient dilution.	If all emission sources of concern are contained by use of local exhaust ventilation, and inadequate air distribution or mixing from the general ventilation system is not a concern: • Typically 6* air changes per hour, otherwise: • Typically 8* air changes per hour. * Scale minimum air change rates upward based on project-specific analysis. Technologies such as indoor air quality sensing can be used to support the results of this analysis.	If all emission sources of concern are contained by use of local exhaust ventilation, and inadequate air distribution or mixing from the general ventilation system is not a concern: • Typically 8* air changes per hour, otherwise: • Typically 10* air changes per hour. * Scale minimum air change rates upward based on project-specific analysis. Technologies such as indoor air quality sensing can be used to support the results of this analysis.
5	Unoccupied Minimum Exhaust Ventilation Rate (one-pass air)	Standard 62.1 (for unoccupied conditions)	Same requirements as for CSDL-0	Same requirements as for CSDL-0	Typically 4* air changes per hour. *Scale minimum air change rate upward or downward based on project-specific analysis. Technologies such as indoor air quality sensing can be used to support the results of this analysis.	Same requirements as for CSDL-3
6	Evaluation/Confirmation of Room Ventilation Effectiveness	Using standard design practice, evaluate supply and return/exhaust devices locations and types, so as to provide adequate mixing of supply air with room air, and prevent stratification.	Same requirements as for CSDL-0	Same requirements as for CSDL-0	Same requirements as for CSDL-0	In addition to the requirements for CSDL-0, verify room ventilation effectiveness via dispersion modeling or physical measurements
11	Consider Continuous Indoor Air Quality Monitoring	If specific volatile chemicals of concern are identified (for example, O2 levels in temperature control rooms)	No	No	When specific volatile contaminants of concern are identified	As specified by project requirements
13	Exhaust Air Filtration or Treatment	Not applicable	No	No	No	To Be Considered in specific situations

Recommended Design Criteria

ITEM #	DESIGN CRITERION	CSDL-0 REQUIREMENTS	CSDL-1 REQUIREMENTS	CSDL-2 REQUIREMENTS	CSDL-3 REQUIREMENTS	CSDL-4 REQUIREMENTS
14	Spark Protection And Explosion Proof Exhaust Fans	Not applicable	For local exhaust systems	For local exhaust systems	For local exhaust systems	To Be Considered in specific situations
15	Duct Materials	Not applicable	Verify Fume Hoods and Exhaust Duct Materials Are Appropriate	Verify Fume Hoods and Exhaust Duct Materials Are Appropriate	Verify Fume Hoods and Exhaust Duct Materials Are Appropriate	Verify all ventilation elements are appropriate
16	Ventilation Diversity Factor	Not a factor	Factor to be considered	Factor to be considered	Factor to be considered	Should not be considered
17	Cooling Diversity Factor	Not a factor	Factor to be considered	Factor to be considered	Factor to be considered	Should not be considered
18	Heating Diversity Factor	Not a factor	Factor to be considered	Factor to be considered	Factor to be considered	Should not be considered
19	Exhaust Capture Velocities	Not applicable	Hood face velocities will be based on capture criteria	Hood face velocities will be based on capture criteria	Hood face velocities will be based on capture criteria	Equipment specific

Chemical Safety Design Levels (CSDLs)

Recommended Design Criteria

ITEM #	DESIGN CRITERION	CSDL-0 REQUIREMENTS	CSDL-1 REQUIREMENTS	CSDL-2 REQUIREMENTS	CSDL-3 REQUIREMENTS	CSDL-4 REQUIREMENTS
Equipment Reliability						
20	Equipment Redundancy	No	No	No	Yes- Exhaust And Supply Air To Have Multiple Components, But Doesn't Have To Be N+1	Yes- Exhaust And Supply Air To Be N+1
21	Manifolding Permitted	Yes	Yes	Yes	Yes	Yes, If Chemical Compatibility Is Verified.
22	Emergency Power	Nothing Beyond Life Safety requirements	Nothing Beyond Life Safety requirements	Nothing Beyond Life Safety requirements	Life Safety requirements, plus: • Fume hood exhaust air should be considered. • Minimum lighting levels on the lab bench should be considered.	CSDL-3 requirements, plus: • General exhaust air should be considered. • Supply air should be considered, in order to prevent excessive negative pressurization.
Computational Fluid Dynamics (CFD) Modeling Requirements						
25	Dispersion modeling to assess building re-entrainment	No	No	No	Yes	Yes
Controls Requirements						
26	Variable Air Volume Permitted	Yes	Yes	Yes. Constant volume fume hood exhaust should be considered. For variable volume fume hood exhaust, minimum duct velocities should be considered.	Same as CSDL-2	CSDL-3 requirements, plus the supply and exhaust systems shall be capable of operating in a constant volume mode during an event.
27	Differential Pressure or Air Volume Offset Control	Not required	Control required during emergency mode of operation only (where applicable)	Control required during normal mode of operation	Same as CSDL-2	Same as CSDL-2, plus minimum differential pressure of 0.01" wg.
28	Not used					
29	Ventilation Parameters Monitoring (e.g., exhaust airflow, differential pressure, air volume offset, etc.)	Alarm when any monitored laboratory conditions are outside their respective acceptable ranges	Same as CSDL-0	Same as CSDL-0, plus provide local alarms for fume hoods. • Provide local alarms for fume hoods. • Provide continuous monitoring of laboratory exhaust airflow.	Same as CSDL-2, plus consider monitoring laboratory differential pressure.	Same as CSDL-3, plus: • Provide continuous monitoring of laboratory differential pressure. • Consider local audible and/or visual alarms for laboratory exhaust airflow and/or differential pressure.
30	Not used					
32	Not used					
33	Trending Reports Capability	N/A	No	Required	Same as CSDL-2	Same as CSDL-2
34	Emergency Purge Mode	Not required	Not required	Should be considered	Same as CSDL-2	Same as CSDL-2

Recommended Design Criteria

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General Laboratory Requirements						
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37	Failure Mode Analysis	Not required	Not required	Not required	Perform failure mode analysis for the following conditions, at a minimum: • Exhaust system failure. • Loss of normal power, and operations during use of standby power. • Loss of laboratory supply or make-up air. • Loss of laboratory differential pressure. • Activation of general building fire alarm.	Same as CSDL-3
36	Building/Room Tightness	Same As General Office Construction	Same As General Office Construction	Same As General Office Construction	Compartmentalization For Proper Pressure/Airflow Control	Same As CSDL-2, plus add vestibules to improve pressurization controls
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38	Signage within room	Yes CSDL-0 required	Yes CSDL-1 required	Yes CSDL-2 required	Yes CSDL-3 required	Yes CSDL-4 required
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43	Site Specific Emergency Procedures Defined	No	No	Yes	Yes	Yes
Other						
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45	Radioactive Material Use Permitted?	No	No	No	Yes, with risk review	Yes, with risk review
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ASHRAE TC 9.10 – Laboratory Systems
Lab Classification Subcommittee

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   A. Scope
   B. Key Definitions
   C. Related Work by Other Organizations
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      1) Laboratory Safety Risk Analysis
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   A. Descriptions & Examples
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ASHRAE TC 9.10 – Laboratory Systems Lab Classification Subcommittee

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Key definitions:

Emergencies: situations in which chemicals are released in amounts or at rates that are beyond those planned for in the laboratory design process. These situations require extraordinary action in order return them to design conditions. It is expected that the primary emergency response strategy will be evacuation of laboratory workers and response by teams equipped with respiratory protection.

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Volatile chemicals: Volatile chemicals are liquids and solids that evaporate at potentially hazardous rates, either through evaporation of the chemical or through products of expected reactions, into the workplace during planned use.

ASHRAE TC 9.10
Energy Efficiency Subcommittee Meeting
Orlando Winter Conference
Tuesday, January 26th, 2015
13:00 – 14:30 p.m.

Meeting Minutes :

Guy Perrreault	Nathan Ho
David Heinzerling	Mary Foutz
Dove Feng	Kim Hagstrom
Alexis t. Gagnon	Cliff Cooper
John Weiland	Kelly Cramm
Mathew Rooke	Roland Charneux
Kent Kuntz	Roger Huggins
Eric Ballachey	Martin Stangl

1. Discussions on the discussions/suggestions on the mission statement.

Proposed mission statement:

The ASHRAE TC 9.10 Laboratory Energy Efficiency Subcommittee, has for primary objective to promote existing energy efficient measures and to provide guidance and resources on more innovative methods in the design of laboratories while maintaining safety.
The subcommittee will be a forum providing energy efficiency strategies for laboratories. These strategies will be in the form of articles, short guidelines, design tools or other.
The subcommittee will also be a point of liaison for other groups within or outside ASHRAE regarding energy efficiency issues (e.g. STD 90.1).

How can the sub-committee support the work of other TC when pertains with Energy efficiency. (Tracking research projects… possibly with other energy Eff. Sub-committees from other committees (9.06, 9.11)

2. Topics to generate one page documents on energy efficiency in laboratories. (Complementary to what I2SL is providing)
    - *Use the chilled water return to cool high load rooms with fan coils – discussed during the meeting and calculations are to be shown to demonstrate the energy savings.*

How will these documents be made available? Discuss Steve Comstock

- Adders to the Design Guide,
- Additions to the Laboratory System handbook chapter online version.

3. Report from 90.1 (Mark Hydeman), Mark is absent, no other comments

4. PWGSC - Lab Energy and Safety Optimization Process (Labs ESOP)

Methods to Achieve Safer, More Energy Efficient and More Sustainable Lab Buildings

Other document: Guideline to Lab ventilation.

Source to base the ASHRAE 1 pagers.

5. Eric Ballachey has accepted chair the Laboratory Energy Efficiency sub-committee for future meetings.