

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

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TC/TG/TRG MINUTES COVER SHEET

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

TC/TG/TRG NO.:	4.10		TC/TG/TRG TITLE:	INDOOR ENVIRONMENTAL MODELING			
DATE OF MEETING:	February 2 nd , 2026		LOCATION:	Las Vegas, NV (Inperson TC Meeting)			
DATE ISSUED:	May 21 st , 2026		RECORDED BY:	Yang-Seon Kim			
VOTING MEMBERS	TERM		PRESENT		OFFICERS	TERM	
	On	Off				On	Off
Ding, Chao	21	25	x	Chair	Phyfe, Duncan	25	27
Sharma, Himanshu	22	26	x	Vice Chair	Kim, Yang-Seon	25	27
Han, Xu	25	29	✓	Secretary	Ding, Chao	25	27
Zuo, Wangda	22	26	✓	Programs	VanGilder, Jim	19	N/A
Shen, Jialei	22	26	✓	Research	Liu, Shichao	22	N/A
Jim VanGilder	25	29	✓	Handbook	Han, Xu	26	N/A
Wang, Leon	23	27	✓	Membership	Chen, Jialei	26	N/A
Lo, James	23	27	✓	Web Page	Dols, William Stuart	19	N/A
Phyfe, Duncan	25	29	✓	Honors and Awards	Lin, Chao-Hsin/ Mohammad Heidarinejad	16	N/A
Willman, Alexander	22	26	✓	ALI	Zhai, John	04	N/A

**ASHRAE TC 4.10 - Indoor Environmental Modeling; Main Committee Meeting – Las Vegas
1:30 pm – 3:30 pm (PacificTime), Monday, February 2, 2026,
Caesars Palace, Octavius 23 (Hybrid)**

Virtual Meeting (Teams Meeting, Meeting ID: 245 808 468 901 6, Passcode: uE2yK29s)

MEETING AGENDA

SCOPE: TC 4.10 is concerned with developing methods and procedures for predicting indoor environmental conditions including airflow, air quality, and thermal environment

1. Call to order - Chair (Duncan Phyfe) 1:30 pm
2. ASHRAE 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.

For more details, please visit ASHRAE's page: <https://www.ashrae.org/about/governance/code-of-ethics>

3. Welcome and introductions (Duncan Phyfe)
 - Correction to meeting time: 2 hours

Please sign the sign-in sheet.

4. Roll call (Jialei Shen) – voting members

Chao Ding x	Himanshu Sharma x	Xu Han 0	Wangda Zuo 0
Jialei Shen 0	Jim VanGilder 0	Leon Wang 0	James Lo 0
Duncan Phyfe 0	Alexander Willman 0		

Officers:

Duncan Phyfe (Chair) | Term Ends: June 2027
Yang-Seon Kim (Vice Chair) | Term Ends: June 2027
Chao Ding (Secretary) | Term Ends: June 2027
Xu Han (Handbook) | Term Started: June 2025
Shichao Liu (Research) | Term Started: June 2025
Jialei Chen (Membership) | Term Started: June 2025
Jim Van Gilder (Program)
Stuart Dols (Webmaster)
Chao-Hsin Lin / Mohammad Heidarinejad (Honors & Awards)

- 8 out of 10 voting members were attended (Quorum was achieved)
5. Approval of Pheonix meeting minutes – vote
 - Duncan made a motion to approve the Pheonix minutes.
 - Alex seconded the motion

- 8 out of 10 YES pass
- 6. Updated from the Liaisons: (Section head (Kyle Gluesenkamp), RL and Publication) we are not so sure if Kyle will be here or not
 - Section Head for our TC: This role is typically a 2-year term.
 - ASHRAE has a strategic plan.
 - If you are interested in please let us know
- 7. Announcements and reports (Mohammad Heidarinejad) 2:40 pm

Chair's Breakfast (already posted)

- 8. Membership – 10 min (Jialei Chen). 1:40 pm

- 2025-2026 Officers
- Chair: Duncan Phyfe
- Vice Chair: Yang-Seon Kim
- Secretary: Chao Ding
- Handbook Subcommittee Chair: Xu Han
- Research Subcommittee Chair: Shichao Liu
- Programs Subcommittee Chair: Jim VanGilder
- Membership: Jialei Chen
- Standards Subcommittee Chair: William Stuart Dols

- 2025-2026 Voting Members:
- Chao Ding
- Himanshu Sharma
- Xu Han
- Wangda Zuo
- Jim VanGilder
- Leon Wang
- James Lo
- Duncan Phyfe
- Alexander Jerome Willman
- Jialei Shen

- 9. Research – 20 min (Shichao Liu). 1:45 pm

- Key Announcements
- Updates from Monday (Research Breakfast Meeting)

- Free download of ASHRAE handbooks and research project reports.
- ASHRAE strategic plan includes development of a formal research strategic plan.
- Survey conducted regarding RAC and research activities.
- Research Advisory Panel (RAP) will coordinate and align research activities with the strategic plan.
- Emphasis on prioritizing ASHRAE research and communicating it to a broader audience.
- Research budget for Society Year (SY) 2025–2026: approximately \$4.012M.
- All PES and PMS members are required to complete training.
- Research Manual has been updated.
- Major change: ASHRAE Technical Papers will be discontinued.

- Research outcomes from ASHRAE projects will instead be submitted to *Science and Technology for the Built Environment*.
 - More applied research may also be submitted to the ASHRAE Journal.
 - RAC will assist in seeking project co-sponsorships, helping reduce sponsor contact and support requirements during the RTAR process.
 - Typical project funding range increased from approximately \$350K to \$500K.
 - A centralized research portal will be used for WS, RTAR, and other materials to streamline administration.
 - The ASHRAE research team is currently updating the ASHRAE research plan, with a strong focus on future research directions.
- RTAR Submissions
 - One RTAR is ready for voting.
 - Another RTAR is currently seeking co-sponsorship.
 - RTAR: LLM with IEQ Modeling
 - Proposed budget: \$150K over 18 months.
 - Proposal has been circulated.

Comments/Discussion:

- Jim: The proposal appears somewhat vague; additional specificity may strengthen it.
- Shichao: Although the funding amount and work statement are relatively limited, this may improve the likelihood of approval. Discussion followed regarding whether there are any major concerns.
- Question raised: Why is this considered pre-processing rather than post-processing?

Motion:

- Motion to approve submission of the RTAR.
 - Motion by Alex; seconded by James.
 - Motion carried.
- Seeking New Sponsorship Opportunities
 - Brad: "External Flow Modeling of Data Centers: Assessing the Accuracy and Risk Levels Associated with Different Dispersion Modeling Methodologies"
 - Co-Sponsorship Discussion for TC 9.9
 - Discussion on whether the title requires revision.
 - TC 4.3 External CFD Modeling
 - Looking for additional contributors.

Motion:

- Motion to co-sponsor the RTAR.
- Motion by James; seconded by Jim.
- Vote: 8 in favor out of 10 present.
- Motion adopted.

“The Comparative Accuracy of Particle, Droplet, and Tracer CFD Models”

- RTAR draft reviewed and returned to Ray for revision.

WS 1956: 2D Resistance (Matt)

- Deadline: March 15.

10. Standards/Guidelines/Handbook – 15 min (Xu Han). 2:10 pm

Xu Han (Indoor Airflow Modeling) requested a review of Chapter 59. Alex volunteered to assist with the review. Review team: Alex, Mohammad, Chao, and Jim.

- The initial review has been completed.

Major Change

- Subsection 4.3: *Multizone Simulation of Demand-Controlled Ventilation (CONTAM)*.

Minor revisions include editing and formatting updates.

Current Plan

- Revise the chapter based on reviewer feedback.
- Maintain the original timeline:
 - One month for voting members to review the revised chapter.
 - Conduct the vote in early March.
 - Submit the final version afterward.

11. Program – 25 min (Jim VanGilder). 2:16 pm

- Acceptance rate : 50%
- Try to match with the sponsorship (session) with an nice abstract
- Potential Sessions

Las Vegas			
Seminar	Leveraging Airflow Modeling to Design Flexible and Resilient Buildings <i>Resubmission from Orlando</i> Track 9: Future-Proofing the Built Environment TC 9.9 co-sponsorship	Wangda Zuo	Matt Kaufeler Mike Koupriyanov Jim VanGilder Matthew Quitadamo
Seminar	IEQ in Early-Childhood Facilities <i>Continues the "IEQ in schools" series</i> Track 8: IEQ for Healthy Buildings TCs 9.7, 2.6 co-Sponsorship	Mohammad Heidarinejad	Mingyu Wang Lily Wang Parichehr Salimifard Christy Troutman

Austin			
Seminar	Modelling and Application of Ultraviolet Germicidal Irradiation	James Lo	Saeed Farhoodi Donghyun Rim

	(UVGI) for Airborne Pathogens in the Indoor Environment Not accepted for Las Vegas Resubmit to Austin Research Summit Track		Bryan Cummings Cary Faulkner
Seminar	Will AI Enhance or Replace CFD for Building Airflow Simulation? All data centers? Co-sponsor? AI Track	Mike Koupriyanov	Matthew Kauffeler Paul Bemis Jim VanGilder Xu Han Duncan Phyfe
Seminar	Beating the Heat: Using CFD to Predict Building Airflow Challenges Under Extreme Temperatures Hot Climates Track	Duncan Phyfe	Paul Bemis Mike Koupriyanov Vincent Tang Matt Quitadamo
Seminar	From Colorful to Meaningful: Recent Advances in CFD Visualization New title? Not accepted for Las Vegas Resubmit to Austin? Research Summit track?	Vincent Tang	Duncan Phyfe Jim VanGilder Matt Kaufeler Mike Koupriyanov
Seminar	Compact Modeling of HVAC&R Equipment for CFD Applications: High-Fidelity Digital-Twin Models Focus on data centers? HVAC&R Systems and Equipment Track	Yang-Seon Kim	Jim VanGilder Shichao Liu Matt Kaufeler Mike Koupriyanov

- We should report Forums, Debates, Seminars, Paper Sessions, TC Research Results, and Other Papers on our TC Activity Form, whether the sessions were organized by the TC or submitted individually by a committee member.
- As a committee, we should proactively suggest conference tracks and session topics. Please refer to the ASHRAE Papers and Programs page for additional information:
<https://www.ashrae.org/conferences/conference-resources/papers-and-programs>

Deadlines

Conference	Seminar, Workshop, Forum, Debate, Panel	Conference Paper Abstract	Conference Paper/Extended Abstract (Summer)	Technical Paper
Las Vegas Winter 2026	Aug 1 2025	May 28 2025	Sep 3 2025	April 2025
Austin Summer 2026	Feb 2026	Nov 2025	Mar 2026	Nov 2025
Chicago Winter 2027	Aug 2026	May 2026	Sep 2026	April 2026

Las Vegas 2026 - Tracks

- Track 1: Fundamentals and Applications
- Track 2: HVAC&R Systems and Equipment
- Track 3: Refrigeration and Refrigerants
- Track 4: Research Summit
- Track 5: Energy Storage and Grid Resiliency

Track 6: Pathways to Building Decarbonization
Track 7: Artificial Intelligence
Track 8: Advancements in Construction
Track 9: Ventilation and Indoor Environmental Quality for Healthy Buildings
Track 10: Future-Proofing the Built Environment

12. Website activity – 5 minutes (Stuart Dols). 2:52 pm
Duncan covered; He has been keep updating things

13. New business – 15 min (Duncan) 2:54 pm

Additional Discussion

- Mike: We need new CFD standards. We may start with smaller efforts, but ultimately some form of standardization and certification process is needed.
- Jim: For data center applications, CFD modeling guidelines already exist, which could serve as a starting point.
- Duncan: The discussion should include consultants and external airflow applications.
- Discussion Question: What is the main driver for this work?
 - Response: Building industrial trust and confidence in CFD applications.
- Mohammad: Existing standards such as Standard 140, 205, 232, and DOE-related efforts exist, but we are still missing a strong driving framework for CFD validation and implementation.
- Jim: We already follow best practices for data center CFD applications, so beginning with those practices may be the most practical approach.
- Mike: Breaking the effort into smaller, targeted applications may be an effective strategy. Two focused applications could provide a strong starting point. This could also demonstrate the value and benefits to industry and companies.
- Shichao: We need to clearly define what we truly want and what is actually needed from the committee.
- Duncan: Only compliant and properly tested approaches should be used for design work.
- Vincent: There may be opportunities to partner with other TCs for this type of standards-related work.
- Discussion Point: Where are the biggest gaps?
 - Every space and application is different, which makes standardization challenging because many uncertainties still exist.
- Key Concern:
 - The software itself is capable, but the major limitation is user error and inconsistent modeling practices.
- James: The focus should include how to prevent incorrect or misleading CFD applications.
- Additional Concerns:
 - Limited guidance exists regarding CFD geometry simplification and modeling assumptions.
 - One major point of concern is how to properly model buoyancy effects.
 - CFD modeling differs significantly from energy modeling, making standardization more complex.
- Suggested Action:
 - This topic could be developed into a formal debate session at a future meeting or conference.

- Alex: Shared that new business-related CFD data have been collected over the past three years through publicly funded research efforts, which may support development of a new website and advanced CFD analysis resources.

14. Reports of relevant activities in other TCs (

TC1.2 *Instruments and Measurements*

TC1.5 *Emerging Computer Applications* – Mohammad Heidarinejad

TC2.1 *Physiology and Human Environment*

TC2.3 *Gaseous Air Contaminants/Removal Equipment*

TC2.4 *Particulate Air Contaminants/Removal Equipment*

TC4.3 *Ventilation Requirements and Infiltration* – Duncan Phillips

TC4.7 Building performance modeling - Wangda Zuo >> Discussion topic: Convective heat transfer coefficients using CFD.

TC5.3 *Room Air Distribution* – Mike Koupriyanov

TC5.6 *Control of Fire and Smoke* – Dahai Qi

TC8.11 *Unitary and Room air Conditioners & Heat Pumps*- Chao Ding

TC9.2 *Industrial Air-Conditioning and Ventilation* – Duncan Phye >> Discussion focused on general ventilation topics. Additional meeting scheduled for tomorrow.

TC9.9 *Mission Critical Facilities* – Jim VanGilder >> Topics discussed:

- Data center applications.
- Selection of bids for a research project related to liquid-cooled IT equipment.
- Heat transfer to the surrounding environment.
- The successful PI is expected to begin work this summer.
- External airflow modeling and co-sponsorship activities related to 2D resistance research.

TC9.13 *Space Extraterrestrial And Deep Space Environmental Control Systems* – Chao-Hsin Lin

SSPC 55- *Thermal comfort* – Mike Koupriyanov >> Discussion on using CFD to support thermal comfort compliance and standards development.

SSPC 62.1 - *Ventilation and Acceptable Indoor Air Quality* – James Lo >> □ Ventilation Subcommittee activities discussed.

- Part of Research Project 1918 focuses on collecting natural ventilation data to support the natural ventilation procedures in Standard 62.1.
- Current findings suggest that some existing approaches may not be functioning as intended.
 - Ongoing discussions and debates are focused on obtaining reliable design data and improving guidance for natural ventilation applications.

15. Honors and awards – 5 minutes (Mohammad Heidarinejad) Congratulations everyone

- **Distinguished Service Award (DSA):** Jim VanGilder, Shichao Liu, Mohammad Heidarinejad. We know a lot of you are eligible to apply / 15 points *Please let us know if you would like to apply. Please reach out to me .*
- **Jim VanGilder – ASHRAE Fellow**

16. Agenda suggestions for next meeting

- Industrial or others, interested in the voting member, please reach out to us

17. Adjournment

- James motion / Alex second

18. Attendance List