

ASHRAE TC 10.1

Custom Engineered Refrigerant Systems, Piping, Controls and Accessories

ASHRAE 2023 Winter Conference - TC 10.1 meeting minutes

February 7, 2023 ~ 1:00 – 3:00 pm ET (UTC -4)

Magnolia (M2-North)

<https://meet.goto.com/220076773>

To: Members and guests of TC 10.1

From: Jim Caylor, Chair

Date: February 7, 2023

I. Preliminaries.

A. Call to order.

B. ASHRAE Code of Ethics Commitment: In this and all other ASHRAE meetings, we will act with honesty, fairness, courtesy, competence, integrity and respect for others, and we shall avoid all real or perceived conflicts of interest and behavior that is discriminatory and/or harassing.

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

C. Self-introductions & attendance sheet.

D. Verify quorum – 10 voting members attending (*red names denotes not in attendance*):

1. Jim Caylor	6/2023*	Chair
2. Wayne Borrowman	6/2026	Handbook Subcommittee Chair
3. Tom Wolgamot	6/2024	Program Subcommittee Chair
4. Alec Cusick	6/2026	Research Subcommittee Chair
5. Greg Scrivener	6/2023*	Standards Subcommittee Chair
6. John Schoen	6/2026	Webmaster
<i>7. Willis Brayman</i>	<i>6/2023*</i>	
8. Kartik Patel	6/2026	
9. Steven Sanders	6/2026	
10. Heather Sharif	6/2023*	
11. Gordon Struder	6/2024	
12. Martin Timm	6/2026	
<i>13. Christopher Williams</i>	<i>6/2023*</i>	

II. Additions/changes to agenda.

III. Review and approval of 2022 Annual Conference draft minutes.

- A. Annual Conference committee meeting draft minutes are in process and will be delivered with minutes from this meeting within thirty (30) days.

IV. Chair's Report (Jim Caylor).

- A. Six (6) officers including six (6) voting members.
- B. Committee officer positions vacant (present).
1. Secretary.
 2. Vice Chair.
- C. Committee officer positions vacant (after 07/01/2023).
1. Standards Subcommittee Chair.
 2. Chair.
- D. Thirteen (13) voting members.
1. **Substantial VM roll OFF after 2023 Annual Conference – start to prepare!**
 2. Brayman, Caylor, Scrivener, Sharif and Williams roll OFF after July 1, 2023.
 3. Eight (8) voting members after July 1, 2023.
 4. *Seeking to balance new voting members between insulation and refrigeration – those interested in assuming a position please contact Jim Caylor.*
- E. Nineteen (19) provisional corresponding members.
- F. Eighteen (18) corresponding members.
- G. Total of (50) members.
- H. *Reminder that members who have not attended any of the last four (4) meetings will be removed from the roster. (i.e., Members need to have attended at least 1 of the last four meetings in order to remain on the roster).*

V. Liaison Reports.

- A. Section 10 Head – Tina Brueckner (SH10@ashrae.net).
- B. Other Societies.
1. *ASHRAE Decarbonization Task Group (Tom Wolgamot)*
 - a. *Technical Committees are looking for guidance with respect to revising the new strategic plan and looking for a liaison from refrigeration to the decarbonization guide task group.*
 - b. *Wayne Borrowman is already on a decarbonization subcommittee but hasn't received any information on the overall decarbonization task force meetings – he will push on the issue to get meeting invitations. Tina Brueckner will provide Jim Caylor with information on the decarbonization group, contacts, etc. to help provide clear communication and coordination.*

- c. See attached “Task Force for Building Decarbonization Board Update” PDF dated February 5, 2023.*
- 2. ASHRAE 15 (Greg Scrivener).*
 - a. The committee continued to meet regularly/monthly. The bulk of proposed changes revolve around A2L refrigerants and looking to harmonize with UL 60335-2-40 & 89. A2L refrigerants are looking to be used in information technology equipment rooms and “comfort applications,” so amendments are looking to be made in the overall language within the standard to accommodate these applications rather than author individual special sections dedicated to these applications. The committee is also looking at how to manage the effects and/or implications of the use of equipment with A2L refrigerants in applications with non-UL listed components/systems with a high heat load. IT applications are currently allowed to go to 50% of LFL as long as other provisions included – there is a PPR “Addendum T” coming out regarding this, including room volume calculations that now become more restrictive.*
 - b. It was suggested that this committee should pay attention to ASHRAE 15 movements with respect to wanting different rules for IT rooms. There may be concerns with different rules for different applications (e.g., seeking special rules to exceed limits for occupied spaces).*
 - c. There is movement with respect to A2L refrigerant retrofitting requirements as well. The code interaction subcommittee of ASHRAE 15 is active on liaising with other organizations. It was suggested that TC 10.1 consider potentially addressing management of change forms for refrigerant retrofits.*
- 3. ASHRAE Std 34 (Danny Halel).*
- 4. ASME (Jim Caylor).*
 - a. B31.5-2022 has been published.*
 - b. B31.1, B31.3, B31.4, B31.5 and B31.8 chairs working under Don Frikken to standardize language on qualifying unlisted components.*
- 5. IIAR (Eric Smith).*
 - a. The IIAR annual meeting coming-up in March, 3 hotels are already sold-out (4th added) so be sure to register soon. IIAR 1-2022 has been published.*
 - b. IIAR published a guideline for accidental refrigerant releases in Summer 2022 with accompanying spreadsheet to assist with calculations, and a training course is offered as well.*
 - c. There was an IIAR standards committee task group formed to look at appropriate techniques for relief valve installations due to seeing variations in the field and receiving feedback from OSHA who was looking to see if there is something more concrete guidance that should be made regarding how to treat*

internal relief valves (i.e., IIAR currently says they don't need to be tested or replaced at all, while OSHA having seen problems in petrochemical industry).

d. IIAR approved a research project for furthering the study of condensate-induced hydraulic shock ("CIHS") in ammonia refrigeration systems. This issue was previously studied, focusing on the time to open motorized valves to introduce hot gas into defrosting coil, while this new research project will look at appropriate sizes for solenoid-operated hot gas valves. This new research project is looking to be kicked-off after the IIAR conference and is currently estimated to be completed in Q4 2023.

e. IIAR is looking at co-funding a couple ASHRAE research projects as well.

6. Insulation societies

a. NIA (National Insulation Association) (Alec Cusick).

i. NIA is updating resources for existing tables to compare physical properties (e.g., k-values, compressive strengths, etc.) for different insulation materials.

b. ASTM (Bill Brayman).

VI. Handbook Subcommittee Report (Wayne Borrowman).

A. Handbook chapters.

1. Insulation: Chapter 10 (Insulation Systems).

2. Refrigeration: Chapter 1 (Halocarbon), Chapter 2 (NH₃), Chapter 3 (CO₂), Chapter 4 (Overfeed), Chapter 5 (Component Balancing), Chapter 13 (Secondary Coolants), Chapter 45 (Concrete Dams), Chapter 46 (Chemical Industry), Chapter 47 (Cryogenics), Chapter 48 (Ultralow Temperature) and Chapter 49 (Biomedical Applications) and Chapter 50 (Terminology) will be reviewed for the 2026 RHB.

3. *Revisions are due in 2026 but most of the work needs to be done by 2025.*

B. Hydrocarbon.

1. Revised chapter 1 working group has met monthly since February 2022.

2. Initial input from Danny Halel with group member comments currently being added to chapter 1.

3. *The electronic document (Word file) of Chapter 1 was obtained to facilitate collaborative changes and updates. Incorporating hydrocarbons will likely be relatively easy; however, incorporating changes in time for publication due dates may prove difficult as f-gas decisions from the United States EPA are possibly not coming until 2025.*

4. *Jim Caylor had initiated a movement to create separate a chapter, but the decision was instead made to revise Chapter 1 by removing old f-gases and bringing-in hydrocarbons and A2L refrigerants into Chapter 1.*

5. *The other view is that there are a number of overlapping global regulations driving the refrigerants available to be used. The United States EPA just released a proposal on December 15th on the proposed phase-down of HFC & HFO refrigerants. Outside of the United States, PFAS regulations are also potentially impacting use – HFO's potentially considered PFAS's are looking to be banned. These changes would drive industries to develop new refrigerants such as hydrocarbons or CO2. Current building regulations don't allow use in user-regulated areas such as, occupied spaces.*
6. *The refrigeration conference at Purdue University last year had a section on A2L & hydrocarbon refrigerants with videos showing how rapidly flame spread occurs, which affects charge limits.*
7. *There will be questions on how building codes handle the situation of connected spaces with multiple refrigeration systems with different refrigerants and charges.*

VII. Research Subcommittee Report (Alec Cusick; project author/leader).

A. WS-1703 Performance of Vapor Retarder Systems Used on Mechanical Insulation.

1. Co-sponsor with TC 1.8 (lead committee).
2. Charley Petty (lead) and Gordon Hart (contributors).
3. *The following is a summary of discussions during a meeting of the ASHRAE TC 1.08 research subcommittee meeting on February 5, 2023 regarding WS-1703. Bill Brayman visited R&D Services on December 20, 2022 and confirmed that many of the insulation and vapor retarder materials had been received. We then discussed an email Charlie Petty had received earlier in the morning today from Michael Joyce of R&D Services which gave a status of the ASTM E96 testing of vapor retarder materials in a flat configuration. Note that these were tested with 90° F / 90% RH environmental conditions. M. Joyce's email reported that seven of eleven materials had been tested and have a reported permeance value:*
 - a. *conventional ASJ, 0.055 perm*
 - b. *poly surface ASJ, 0.011 perm*
 - c. *PVC protective jacket, 0.049 perm*
 - d. *water-based vapor retarder mastic and fabric, 0.088 perm*
 - e. *solvent-based vapor retarder mastic and fabric, 0.016 perm*
 - f. *NBR/PVC standard permeance flexible elastomeric insulation with no vapor retarder, 0.18 perm*
 - g. *EPDM very low permeance flexible elastomeric insulation with no vapor retarder, 0.012 perm.*
4. *In a discussion that followed, it was noted by Monroe Shumate that some permeance results were greater than manufacturer stated values and some were within manufacturer stated values. He, Charlie Petty, and Bill Brayman questioned*

whether the conventional ASJ material was received off a roll or taken off a piece of fiberglass with ASJ pipe insulation, resulting in possible damage to the inner aluminum foil when pulled from the adhered surface. Diana Fisler, Pat Noonan, and Natalia Maximova also expressed concerns about these issues. It was further noted that these tested permeance values may be larger than manufacturer stated values because the environmental conditions for these RP-1703 tests used 90° / 90% RH conditions rather than the 75° / 50% RH conditions normally used for ASTM E96, Procedure A tests.

5. *The email from M. Joyce also stated that “straight forward cylindrical tests” had already started but none yet completed. Discussion ensued about the materials used to form a cylinder which holds the desiccant on its inside and the pipe insulation on its outside. As I understand it, some use a textile material and some use expanded metal with a large % open area (about 75%). Concern was expressed that these may not result in the same results, everything else being equal. The meeting ended without resolution to these issues.*

B. RP-1721 Oil Return and Retention in Unitary Split System Gas Lines.

1. Co-sponsor with TC 8.11 (lead committee).
2. Gordon Struder is on PMS.
3. *The remaining testing set (R32 / POE100) has been finished and reported. All the proposed experimental test has been finished.*
4. *The EES model with POE100 has been updated and integrated with GUI.*
5. *The validation of POE 100 experimental data has been performed.*
6. *The model is able to predict all the tested conditions with reasonable accuracy. All the model development and validation have been finished.*
7. *The final report is being finished now, will be reviewed, and shared soon.*

C. RTAR-1871 Hygrothermal Modeling of Below Ambient Pipe Insulation Systems in Buildings and Refrigeration.

1. Co-sponsor with TC 1.8 (lead committee).
2. Manfred Kehrer and Gordon Hart are authors.
3. *This will be approved after data are received from RP-1703.*

D. RTAR-1513 (old) Liquid/Vapor Separation in Vessels.

1. Originated in TC 10.1.
2. Doug Scott and Bent Wiencke to update.
3. *There was a meeting mid-January with Alec Cusick to download all data and progress on this RTAR dating back approximately 12 years ago. The potential research generally presents value to ASHRAE, but CO2 and small charge ammonia/DX systems would greatly benefit from cost-efficient sizing of vessels due to the greater cost impact compared to size of system. The current thinking is to*

start from scratch with this RTAR and refocus on the mid-size ammonia & CO2 market sector, thinking systems in the range of 300 to 500 tons total refrigerant charge.

4. *Previous thinking has been to evaluate the upper limit for liquid carryover causing damage to a compressor (e.g., slugging), but due to limitations of finding what may be considered “acceptable” carryover by compressor manufacturers, perhaps instead the RTAR should focus on evaluating oil dilution effects on compressor lubrication?*
5. *The CO2 industry generally follows conventional guidance from the chemical process industry with respect to separator vessel sizing guidance, but wall effects can become more significant as sizes get smaller.*
6. *Suggest potentially resubmitting as new RTAR for updated scope definition.*

VIII. Programs (Tom Wolgamot)

A. Old TC 10.1 topics.

1. Effects of packaging.
2. HT heat pump applications.
3. CO₂ transcritical component sizing.
4. Ice rink system comparison (probably for new TC 10.2).
5. Commercial propane system application (Whole Foods?).
6. Small ammonia forum.
7. Greenhouse loads (probably for new TC 10.2).
8. Std 15 requirements for A2L ventilation requirements (Greg Scrivener).
9. R507 systems.
10. Refrigerant conversions
 - a. Section 3.
 - b. TC 1.3.
 - c. Follow-up.
11. Refrigeration system resilience.
12. Decarbonization & grid electrification.
 - a. *It would be helpful to have information on decarbonization considerations, how to go about making it attractive to owners, and highlight successes (e.g., supermarkets, ice rinks, etc.)*
13. Energy storage.
 - a. *Potentially use supermarket refrigeration heat recovery as case study?*
14. *United States EPA proposed limitations on refrigerants – how do we prepare an industry on handling the necessary changes?*

IX. Old Business.

A. Action Items.

1. Update roster and activity forms.
2. Review code of ethics and update website biographical information
3. Additional Action Items?

X. New Business.

A. *Coordinate future committee meetings with USNC/IIR (1400-1600 ET on Tuesday; Omni – Spruce (A-South).*

1. *TC's 10.1 and 10.2 may consider shifting meeting times (e.g., TC 10.1 meets an hour earlier, then join USNC/IIR meeting, then TC 10.2 meets an hour later) so those interested can attend all meetings. Voting memberships of each committee will discuss and decide.*

B. TC 10.1 organization.

1. Goals.

- a. Streamline committee organization where appropriate, but maintain refrigeration/piping efforts separately.
 - i. Handbook chapters.
 - ii. Research projects.
- b. Retain general refrigeration presence in ASHRAE & specific piping emphasis.

2. Means.

- a. Subgroup meetings with specific emphasis.
 - i. Piping.
 - ii. Insulation.
 - iii. Custom engineered refrigeration systems.
- b. Overall committee meetings divided into time slots.
- c. Temporary formations in and among committees for any given project.
- d. Virtual meeting technology.

C. Create TC 10.01 Basecamp.

XI. Next Meeting: Tampa, FL; 06/24-28/2023.

A. <https://www.ashrae.org/conferences/2023-annual-conference-tampa>

B. Virtual and face-to-face!

XII. Adjourn.

A. *Vote to adjourn by Kartik Patel (seconded by Steve Sanders). Motion passes.*