



1791 Tullie Circle, N.E./Atlanta, GA 30329

**404-636-8400**

TC/TG/MTG/TRG MINUTES COVER SHEET

**DRAFT**

TC/TG/MTG/TRG No. 8.1 DATE Jan 23<sup>rd</sup>, 2024

TC/TG/MTG/TRG TITLE Positive Displacement Compressors

DATE OF MEETING Jan 23<sup>rd</sup>, 2024 LOCATION Hybrid/ Chicago Marriott Marquis Shedd AB(2)

VOTING MEMBERS	PRESENT Y/N	VOTING MEMBERS	PRESENT Y/N	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Alex Schmig (06/30/2035) Vice-Chair	YES			See Attachment 1
Chris Seeton (06/30/2026)	YES	Vincent Hwang (06/30/2025)		
<b>Davide Ziviani (06/30/2024) Chair</b>	YES	<b>Georgi Kazachki (06/30/2024)</b>		
Erik Anderson (06/30/2026) Program	YES	Heinz Jürgensen (06/30/2026)	YES	
Jim Douglas (06/30/2025) Std/Member	YES			
Michael Perevozschikov (06/30/2025)	YES			
Riley Barta (06/30/2025) Secretary	YES			
Scott MacBain (06/30/2026) Handbook	YES			
<b>Justin Prosser (06/30/2024)</b>	YES			
<b>Margaret Mathison (06/30/2024)</b>	YES			

**DISTRIBUTION: All Members of TC8.1 plus the following:**

TAC Section Head: Charles Henck	SH8.1@ashrae.net
All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters (Research, Standards, ALI, etc.)	See ASHRAE email alias list for needed addresses.
Mike Vaughn, Manager Of Research & Technical Services	MORTS@ashrae.net

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

**1) Call to Order – Davide Ziviani (Chair)**

- Introductions
- Minutes – **Riley Barta (Secretary)**
- Establishment of Quorum (13 VMs) - **Jim Douglas (Membership Chair)** **10-0-0-2 CNV**

Davide Ziviani called the meeting to order at **3:36 PM** on Tuesday, Jan 23, 2024. Attendees were reminded to review the ASHRAE Code of Ethics (<https://www.ashrae.org/about/governance/code-of-ethics>).

All members and visitors present self-introduced as part of a formal roll call to establish the meeting attendee list. There were **29** total attendees at the meeting (**20** in person and **9** online). Attendees are listed in **Attachment 1**.

**2) 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 interests. (See full Code of Ethics: <https://www.ashrae.org/about-ashrae/ashrae-code-of-ethics>.)

**3) Establishment of a Quorum – Jim Douglas**

The Technical Committee consists of **13** voting members, one of which is a non-quorum voting member. **11** of the **13** voting members were present; **3** online voting members joined later.

**4) Review and Approval of the 2023 ASHRAE Annual Meeting in Tampa Minutes**

Scott MacBain moves that the 2024 Annual meeting minutes from Atlanta be approved, Chris Seeton seconds. The vote passes: **(10-0-0-2 CNV)**

**5) Liaison Report (as they arrive)**

- Section 8 Head (Kashif Nawaz)
- Research Liaison (Carl Huber)

**Report from Heads**

**6) Report on TC/TG Section 8 Chair's Breakfast Meeting – Davide Ziviani**

TC Chair Breakfast (Davide):

- Activity Forms: 9PM Jan 23<sup>rd</sup>
- Presentation uploaded on Basecamp
- ASHRAE Role in the Globalization of Standards – Global Technical Interactions Committee (GTIC)
  - Globalization efforts to improve ASHRAE impact ; influence International Standards
  - GTIC Membership: South Africa, US, India, Malaysia, UAE, Colombia, Singapore, Greece, Mexico, Netherlands
  - ASHRAE members can get involved in international standards by joining U.S. TAG, ISO meetings etc.
- It was asked to poll TC members on their involvement with local ASHRAE chapters. **Counted 6 in TC8.1**
- Task Force for Building Decarbonization
- 2024 Winter Program Statistics
  - 91 programs (11 panels; 4 forums; 72 seminars); 124 total with paper sessions

- Government Affairs Department ([GovAffairs@ashrae.org](mailto:GovAffairs@ashrae.org) & [www.ashrae.org/government-affairs](http://www.ashrae.org/government-affairs))
  - Outreach activities
  - 35 written letters/documents SY22-23; 24 written first half SY23-24
  - Testimony
- ASHRAE Strategic Plan
  - Current Strategic Plan covers 2019-2025
  - Next Strategic Plan is under development and your input is sought:  
<https://strategicplanfeedback.ashrae.org>
  - ASHRAE will pull response data on: **January 31 and May 31 2024**



CEC Report: update on DSA/ESA point tally form under Category F, Item 9:

- Service: Review of Abstracts, Conference Papers, Journal Articles
- Points: ¼ per package of 5 reviews with a maximum of 2 points total

## 7) Standards – Jim Douglas (Chair)

- **Standard 23-2022, Methods for Performance Testing Positive Displacement Refrigerant Compressors and Compressor Units.** Standard 23-2022 will be due for periodic maintenance (Revise, Reaffirm, or Withdraw) at the 2025 ASHRAE Winter Conference. TC 8.01 will likely vote to approve Reaffirmation of this standard during the TC 8.01 meeting at this conference.
  - i) Up for revision 2025. Motion Scott/ Second Michael 10-0-0-2 CNV
  - ii) Discussion Std. 23/225 [Alex]; [Scott] close enough that could be combined. There will be discussions around combining TC8.1/TC8.2 vs. Std 23/225
  - iii) Std. 225 [Mark Weber]. Revise references.
- **Standard 41.4-2015, Standard Methods for Measurement of Proportion for Lubricant in Liquid Refrigerant.** SSPC 41 Subcommittee 41.4-2015R, chaired by Jim Douglas, will meet in early January 2024. The goal of this subcommittee is to reach consensus on the 41.4-2015R 1st Publication Public Review draft during the 2024 ASHRAE Annual Conference.
  - i) Meeting will occur over the next several weeks and send it for public review.
  - ii) Reviews at the 2024 Annual Indianapolis
- **Standard 41.9-2021, Standard Methods for Refrigerant Mass Flow Measurement Using Calorimeters.** Standard 41.9-2021, chaired by Michael Perevozchikov, is due for periodic maintenance (*Revise, Reaffirm, or Withdraw*) at the 2024 ASHRAE Winter Conference. SSPC 41 voting members will vote to Revise Standard 41.9-2021 during the SSPC 41 meeting at the conference.
  - i) Revise
- **Standard 41.10-2024, Standard Methods for Refrigerant Mass Flow Measurement Using Flowmeters.** Standard 41.10-2024, chaired by Pat Collins, will be published within the next few

months. This is the first version of this standard that includes supercritical refrigerant flow measurements in addition to subcritical refrigerant flow measurements. Thanks to Scott MacBain for providing technical guidance for the content regarding supercritical refrigerant flow measurements.

From TC8.1&8.2 Joint SubCom Meeting:

- [Phillip Johnson] discussion around ASHRAE Std. 15 and refrigerant challenges due to unintended releases into water streams
- Std. 22-2012 out for public review
- SPC 196P; goal of getting out for public review Spring 2024.
- ISO/TC 86/SC 4 (Justin Prosser)
  - Harmonizing testing and rating standards for compressors with US and European standards; on a good path for nice alignment
- Standard 184; TC8.2 voted to form a committee; Phil will work to submit necessary documents to officially form committee; Mark to chair
- Rick made a comment on chiller efficiencies Std. 90.1; topic is part of the agenda for Chicago; 8.2. has consistent, informative updates on the topics but the majority of action takes place in SPC on 90.1.

## 9) Research – Matt Cambio (Chair)

- Report from Research Subcomm. Chair's Breakfast (Monday Jan 22<sup>nd</sup>, 7:00 – 9:15 am CST; Marriott Marquis Chicago, Grand Ballroom B(4))

Research SubCom Breakfast (Davide Ziviani/Matt Cambio):

- ASHRAE Research Strategic Plan (2021)
  - RTARs/WS need to be addressing the research plan.
  - Budget:
    - SY2021-22: \$5.50M
    - SY 2022-23: \$5.50M
    - SY 2023-24: \$TBD
  - Need to develop WS/RTAR as funding is available.
- Future changes:
  - Better budget cost estimations. Better evaluate bidders. Will be included these changes in Research Manual
  - TCs are encouraged to leverage cofunding projects
  - Provide a better list of bidders; social media seemed to have helped the bidding process and promoting research
  - RAC approves up to \$350,000/project
- Since 1959, ASHRAE sponsored 956 projects. Research reports are available to all members
- ASHRAE Research Award:
  - No nominations received last year.
  - Deadline date is Sept 1
  - Encourage you to start the process today since it involves summarizing nominee activities on a scoresheet.

- Vote of RTAR/WS: include votes both main TC and all listed co-sponsoring TCs. In the WS, milestones should be included to track progress. If a document (RTAR/TC) need to be resubmitted, include coversheet explaining how the comments have been addressed (it helps new RAC members)
- **WS-1793 – Motor cooling research/thermal conductivity method of test**
  - i) WS-1793 has been idling since 2020; to be updated to align with ASHRAE long-term goals; Matt Cambio sent an email to Daryl Showalter and replied TC8.1 should lead.
  - ii) At Research Chair Breakfast, Carl Huber: revised.
- **1879-RP – Foamability properties of LGWP refrigerants**
  - i) Updates from Craig Bradshaw: constructing the test apparatus and identified pairs (TC 3.4). Kyle Sheppard provided updated in Chicago.
- **1716-RP Oil Concentration of Field Installed Liquid Chillers with Flooded Type Evaporators.”** has started (Delta Heat, Germany) Lead TC8.2
  - i) 41.4-2015 on liquid ref. samples for oil measurements being updated; J. Douglas leading; concerns leading to liquid filling guidance; Phil to pass on to TRP-1716 PI for information

#### RTAR Ideas:

[Davide and Craig] to continue efforts on uncertainty quantification of extrapolation capabilities of multi-refrigerant semi-empirical compressor models. RTAR to be submitted March 15, 2024.

Quantification of liquid-vapor separation (CO<sub>2</sub> as the refrigerant) -> follow up with Joe S. in Chicago  
Started in TC 10.1; pushing it to be more experimental than modeling-based. Waiting on Research Subcom Chair to put together a team

[Matt Cambio] Sub atm operation with low-GWP refrigerants in heat pumps

- Effect of leak rates (e.g., joints)
- Design guidelines (pressure ratio)
- Refrigerant breakdown
- Quantitative metrics
- [Chris Seeton] compressor operation/performance rather than flammability aspects
- [Jurgen] ammonia operation sub-atm, lessons learned?!
- Additional funding through AHRI.
- RTAR draft by Matt Cambio

#### 10) Program - Erik Anderson (Chair)

- TC 8.1 sponsored in Chicago:
  - **Seminar 41 (Intermediate; Jan 23 9:45-10:45am CST)**, “Natural Refrigerants in Refrigeration: Regulations and Applications” (Chair: Davide Ziviani). Co-Sponsor: TC8.2 **Attendees: ~216**
  - **[Not Selected]** Title: “Advanced Compressor Modeling and Analysis”. Chair: Craig Bradshaw
- For 2024 Annual Conference in Indianapolis, IN (program deadline 2/26/2024):
  - Track 1: Fundamentals and Applications (Track Chair: Attila Biyikoglu)
  - Track 2: HVAC&R Systems and Equipment (Track Chair: Ng Yong Kong)
  - Track 3: Research Summit (Track Chair: Kristin Cetin)
  - Track 4: Professional Development (Track Chair: Ahmed Abdelsalam)
  - Track 5: Electrification: Possibilities and Pitfalls (Track Chair: Kevin Brown)
  - Track 6: Artificial Intelligence and the Built Environment (Track Chair: Vinod Venugopal)

- Track 7: Building Life Cycle Assessment (Track Chair: Money Khanna)
- Track 8: Legislation, Standards, Codes and Guidelines (Track Chair: Cindy Callaway)

### Proposal

- Seminar on advanced compressor modeling and analysis proposed to resubmit in Indianapolis. Yintao Wang volunteered to be 4<sup>th</sup> speaker; Craig to share notes and discuss in Chicago. 3 PD + 1 Centrifugal  
**Co-Sponsorship to be voted on for reaffirmation in Chicago. Alex/Chris 10-0-0-2 CNV**
- Alex Schmig is Program Chair for TC 10.6 and could support further co-sponsorship
  - **Pause submissions. No real strong proposal**
- Rick Heiden suggested compressor unloading characteristics in heating; temperatures, applications, loading behavior, gaps, etc. -> Davide Ziviani suggested Track 2; could be Track 5 (Drew Turner), which could be overcrowded, but is certainly worth a try as it fits well. **“Specific Challenges for Compressors in Heating Applications,”** -> Further suggestions from Farhan:

1. Modulating for Mastery: The New Frontier in Heating System Efficiency
2. Heating Redefined: Emerging Trends and Challenges in Compressor Technology
3. Advancements in Part-Load Performance: Modulating Capacity for Optimal Heating Efficiency
4. The Future of Heating: Adaptive Compressors and Smart Capacity Modulation”

- Craig volunteered to speak; project on compressor selection for heat pumps
- Rick volunteered to speak about applications
- **Riley Barta volunteered to chair**; 8.1 lead, 8.2 co-sponsoring; will be voted on in Chicago

### **Track 2 (Track 5 option) Specific Challenges for Compressors in Heating Applications Davide/Erik 10-0-0-2 CNV**

- From TC8.1&8.2 Joint SubCom Program 8.2
  - [Track 8] Phil suggestion – now that nat. refs are in full swing; i.e., change to ASHRAE 15, dealt with unintended release of flammable refrigerant. -> any other concerns about other
  - Machining room ventilation rates? (Chris)
  - RTU + A3 discussions
  - Chance to develop a seminar on this topic? Towards Track 2 (Davide) or Track 8 (Phil)?
  - Heinz -> comment regarding insurance companies recognizing

- **Motion to propose (both seminars): Davide Ziviani; 2<sup>nd</sup>: Alex Schmig (0-0-0-0 CNV; passed)**

### **11) Handbook – Scott MacBain (Chair)**

- TC8.1 Refrigeration Chapter 8-factory Dehydrating, Charging & Testing (revision due 2026)
  - i) **From Kevin Muldoon: 8.1 – Chapter 8: Davide and Scott – Please complete the review form and send back to me after your TC meeting. Submit and make revisions.**
- TC8.1&8.2: 2024 HVAC Systems and Equipment: Chapters 38 (Compressors) and 43 (Liquid Chilling Systems) for revision in 2024 (submitted Q4 Fall 2023).
- Other notes: Jethro Medina (Chemours) [TC8.1/TC8.2] is interested in learning about Handbook position; Davide, Mark and Drew provided their insights; Jethro Medina (Chemours) is interested and will note it at the Chicago meeting. Bruno de Carvalho (Honeywell), Farhan Juratli and Yintao Wang

(Danfoss Turbocor) – first time subcommittee guests

## 12) Membership - Jim Douglas (Chair)

- **Current Leadership through 2024 Annual Meeting**
  - Chair: Davide Ziviani
  - Vice Chair: Alex Schmig
  - Secretary: Riley Barta
  - Handbook: Scott MacBain
  - Programs: Erik Andersen
  - Standards: Jim Douglas
  - Research Chair: Matt Cambio
  - Webmaster: Eric Berg
  - Membership: Jim Douglas
- VM: 13 voting members + 1 international
- 2024 Annual meeting, 4 VM to roll off. This will need to be addressed in Chicago
- Davide Ziviani will roll off at Summer 2024 meeting, Alex Schmig will then then move to chair, will have at least one open position and additional volunteers to become voting members.
  - Voting: Craig Bradshaw, Eric Berg
- Scott McBain to step down as Handbook Chair

## 13) Website – Davide Ziviani

- Website is up to date.
- Basecamp will also be updated
- Programs submitted over the years also to be uploaded

## 14) Old Business

## 15) New Business

Awards nominations Tiffany Abruzzo

[Alex Schmig] TC8.2 has an Award Chair, is that something that would interesting to TC8.1? Discussion in Chicago; Rick H. outgoing chair.

## 16) Adjourn

Motion to adjourn by **Jim Douglas** at 4:45 PM CST

**Attachment 1 – Meeting Attendance List**

**In Person**

1. Davide Ziviani (Chair)
2. Alex Schmig (Vice Chair)
3. Matt Cambio (Research SubCom Chair)
4. Joshua Hughes (CM)
5. Syed Angkan Haider s
6. Tae Kwon
7. Hannah Spargur (Guest)
8. Lauren Man (Guest)
9. Haotian Liu (CM)
10. Eckhard Groll (CM)
11. Michael Perevozchikov (CM)
12. Craig Bradshaw (CM)
13. Chris Seeton (VM)
14. Eric Berg (Webmaster)
15. Andrew Hjortland (CM)
16. Matt Mowers (CM)
17. Scott MacBain (Handbook SubCom Chair)
18. Gang Wang (CM)
19. Jethro Medina (CM)

**Online**

20. Riley Barta (Secretary)
21. Jim Douglas (Membership)
22. Erik Anderson (Program SubCom Chair)
23. Mingxia Hu
24. Joe Sanchez (CM)
25. Parveen Dhillon (CM)
26. James Spalding
27. Eric Newberg
28. Margaret Mathison (VM)
29. Justin Prosser (VM)

## **Attachment 2 – Code Of Ethics**

### **ASHRAE Code of Ethics**

(Approved by ASHRAE Board of Directors January 31, 2007)

As members of ASHRAE, we pledge to act with honesty, fairness, courtesy, competence, integrity and respect for others in our conduct.

Efforts of the Society, its members, and its bodies shall be directed at all times to enhancing the public health, safety and welfare.

Members and organized bodies of the Society shall be good stewards of the world's resources including energy, natural, human and financial resources

Our products and services shall be offered only in areas where our competence and expertise can satisfy the public need.

We shall act with care and competence in all activities, using and developing up to date knowledge and skills.

We shall avoid real or perceived conflicts of interest whenever possible, and disclose them to affected parties when they do exist.

The confidentiality of business affairs, proprietary information, intellectual property, procedures, and restricted Society discussions and materials shall be respected.

Each member is expected and encouraged to be committed to the code of ethics of his or her own professional or trade association in their nation and area of work.

Activities crossing national and cultural boundaries shall respect the ethical codes of the seat of the principal activity.