

TC 8.5: Liquid to Refrigerant Heat Exchangers
Minutes ASHRAE 2022 Annual Meeting

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

TC/TG/MTG/TRG MINUTES COVER SHEET

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

TC/TG/MTG/TRG No. TC8.5 DATE 02/06/2023

TC/TG/MTG/TRG TITLE Liquid to Refrigerant Heat Exchangers

DATE OF MEETING 02/06/2023 LOCATION Atlanta, GA

MEMBERS PRESENT	YEAR APPT D	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE	
Adnan H Ayub ('22)	7/1/2018	Khaled Saleh ('25)	7/1/2021	<u>Cor. Members</u>	<u>Pro Cor. Members</u>
Nicholas Zupp ('25)	7/1/2021	Benjamin Dingel ('26)	7/1/2023	Jim Bogart	Bradley Bock
Minoo Mehdizadeh ('24)	7/1/2020	Gurunarayana Ravi ('26)	7/1/2023	Druv Hoysall (YEA)	Ning Tang
Vikrant C. Aute ('23)	7/1/2019			Lokanath Mohanta	<u>Guests</u>
Pedro Perez ('24)	7/1/2020			Joe Huber	Christiano Dias
Andreas Knoepfler ('25) (Int'l)	7/1/2021			Sugun Tej Inampudi	Bruno de Carvalho
Icksoo Kyung ('24)	7/1/2020			Stefan Elbel	Lucas Mhlbachler
Stanislav Perencevic ('23)	7/1/2019			Achim Gotterbarm	Joshua Rothe
Pratik S Deokar ('26) (YEA)	7/1/2023			Austin Armstrong	Francis Proventia
				Jun Li	Mosope Ismail
				Yirong Jiang	Chris Keinath
				Ken Schultz	Saad Ayub Jajja
					Muneeshwaran
					Timm Buchite
DISTRIBUTION: All Members of TC/TG/MTG/TRG plus the following:					
TAC Section Head: Kevin Mercer, Charlie Henck			SH8@ashrae.net		
Research Liaison: Carl Huber Standard Liaison: Srinivas Katipamula Staff Liaison: Steven J Hammerling Handbook Liaison: Derek Crowe			srinivas.katipamula@pnnl.gov shammerling@ashrae.org		
Mike Vaughn, Manager Of Research & Technical Services			MORTS@ashrae.net		

YEA: Young Engineers in ASHRAE, Int'l: International Members, from outside USA and Canada

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

TC 8.5: Liquid to Refrigerant Heat Exchangers

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1. Monday, February 06, 2022, 2:40 PM. Call to order and reading of TC 8.5 scope (A. Ayub):
 - *TC 8.5 is concerned with the thermal and mechanical design, performance, and application of devices for accomplishing heat transfer between refrigerants (including secondary refrigerants) and liquids.*
2. Introduction of members and guests (in-persona and virtual)
3. ASHRAE Code of Ethics Commitment (A. Ayub)
 - *“Commitment to the ASHRAE Code of Ethics – 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>)

4. Establish quorum requirements (A. Ayub)

- 3 out of 12 voting members present (6 in-person and 3 virtual), quorum established.

Adnan Ayub (Chair, Handbook) '22	Vikrant Aute (MTG A) '23	Andreas Knoepfler '25	Benjamin Dingel '26 (not present)
Nicholas Zupp (VC) '25	Pedro Perez (Webmaster) '24	Icksoo Kyung '24	Khaled Saleh '25 (not present)
Minoo Mehdizadeh (Program) '24	Gurunarayana Ravi, '26 (not present)	Stanislav Perencevic '23	Pratik Deokar (secretary) '26

- Shared e-mail aliases of subcommittee chairs in presentation.

5. Review/approve minutes from previous meeting (A. Ayub)

- Motion to approve minutes made by A. Gotterbaum
- Seconded by V. Aute
- No objections or comments, and minutes approved by all members

6. Section Head comments (C. Henck)

- The new roster needs to know if the members are international members if they are from outside USA and Canada
- The roster should have updated email addresses of members
- Program submission due February 27th
- The workbook for the TCs need to be submitted by midnight of February 7th
- Winter meetings have two workbooks, workbook 1 with color code inside with red, green, and yellow color and workbook 2
- While the annual meetings have only workbook 1 that needs to be filled and submitted
- The color codes in workbook 1 let know how the committee is doing, and it should also serve for self-evaluation

7. Liaison comments

8. Handbook subcommittee report (A. Ayub)

- The deadline to edit chapter 39: Condensers and chapter 42: Liquid Coolers (for 2024 version) is 31st July 2023, and then need to send Chapter Approval Checklist
- A. Ayub will check if 2024 and earlier ASHRAE handbooks could be edits in word document
- 2025 ASHRAE Handbook and later will allow edits via pdf only through authoring portal
- Jerry Algere can be contacted to get access to the authoring portal

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9. Standards subcommittee report (J. Huber)
 - SPC-22 and SPC-181 had revisions of Standards 22 and 181, respectively, in summer and fall to fix outdated references
 - Public review draft for Standard 181 went out for 45 days review on January 13, 2023
 - Public review draft for Standard 22 went out for 45 days review on February 3, 2023
 - If there are no comments, the standards will roll out for publication
 - Standard 24-2019 is due for re-affirmation, revision, or withdrawal
 - In the last summer it was voted by SPC to withdraw the reference to ASHRAE Guideline 2 from Standard 24
 - J. Huber added that the standards approval process is going to change to streamline the process, where a standards liaison will be in the approval process
10. Webmaster report (P. Perez)
 - Website is up to date
11. Research subcommittee report (K. Nawaz)
 - Update from the Research Sub-Committee Breakfast Meeting
 1. Research Administration Committee (RAC) discussed on operating procedure for planning and coordinating research and technical studies
 2. ASHRAE Research Strategic Plan is available on website
 3. Budget had a downfall due to covid, but now the planned budget is \$5.5M for 2022-2023
 4. The budget can now fund new investigator award and student GIAs
 5. RAC asked to actively participate in RTAR and WS development that are in line with the ASHRAE strategic goals
 6. One should make good references to the ASHRAE strategic goals in their WS
 7. 42 active research are going on, with value of \$6.2M
 8. 9 research projects went out for bids, but investigators are not responding with bids, these are the submission that were done before covid where the budget presented may be too high get bid responses
 9. RAC reviewed 4 nominations for the Homer Addams Award and the recipient will be revealed after final RAC meeting on Wednesday
 10. Carl Huber is section 8 Research Liaison
 - Notes for writing RTAR and WS
 1. RTAR is a preproposal for research, it is low burden for assessment and helps to get good feedback
 2. WS has more detailed work plan and specific details of deliverables
 3. It is always good to know who potential bidders would be
 4. Jim Bogart added that the research liaison review RTARs before submitting, so get much feedback and have an advocate
 5. RTARs are helpful to get feedback and prepare WSs
 6. However, WS can be written directly, but only in rare instances it was accepted in the past
 7. RAC submission deadlines are March 15, May 15, August 15, and December 15
 - TRP-1731: “Heat Transfer Performance of Medium Pressure Lower GWP Refrigerants in a Flooded Evaporator Comprising an Enhanced Tube Bundle” (K. Nawaz)
 1. The WS will go back to RAC
 2. The WS was revised to reduce the scope and budget than what it was two years back

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- 1800-RP: “Spray Evaporation on Enhanced Tube Bundles with Low GWP Pure Refrigerants and Refrigerant/Miscible Oil Mixtures” (PMS Chair J. Huber; co-sponsor with TC 1.3 whose PMS Chair is Z. Ayub)
 1. TC 8.5 and TC 1.3 research subcommittee had virtual research review meeting on Sunday, February 5th
 2. L. Cremaschi presented new results on spray evaporation of R-1234ze(E) and R-1233zd(E), on square and triangular pitch tubes, and the effects of oil on results
 3. The project is in the stage of correlation development
 4. The PI plans to submit the report by the end of February 2023
 5. There will be no need for extension, as the report will be submitted before the end of February.

- LGWP condensation on enhanced tube bundles RTAR
 1. This RTAR is in pipeline

- Characterization of Heat Transfer in Fluted Tubes RTAR
 1. No updates

- Other RTARs, WS, and new topics for research
 1. K. Nawaz asked to forward him short descriptions of RTAR and WS for anyone interested
 - Y. Jiang will prepare on an RTAR topic
 - V. Aute discussed RTAR on additive manufacturing and characterization of 2-phase flow in heat exchangers

12. Program subcommittee report (P. Mehdizadeh)

- ASHRAE Winter 2022, Atlanta, has 8 Tracks with a mixture of live and on-demand sessions, available for 18 months
- Deadline for Tampa 2023 Annual is February 27th for Program proposals, and there are total of 7 tracks
- Next ASHRAE Annual Conference is on June 24-28, 2023, Tampa, FL
- A. Aute proposed to have a new seminar program to highlight latest developments happening in shape and topology optimized designed of novel heat transfer surfaces
 1. A. Aute would be one presenter, K Nawaz said he would check for a presenter from ORNL
 2. Topics would cover characterization of 1-phase performances and immersion cooling
 3. Voting on this new seminar topic will be via email ballot after the speakers and content is decided
- TC 8.5 co-sponsored Seminar ‘In-Tube Flow Evaporation and Condensation Performance of Low GWP Refrigerants’, but was not selected for the Atlanta 2023 Winter conference
- Re-submission of seminar ‘In-Tube Flow Evaporation and Condensation Performance of Low GWP Refrigerants’ for next Tampa 2023 Annual was discussed
 1. Motion to re-submit was made by P. Mehdizadeh
 2. Seconded by V. Aute
 3. Votes yes to re-submit with TC 8.5 as main sponsor. The vote was 9-0-0-3
 4. TC 1.3 will be co-sponsor if they vote to re-submit the next day

- C. Henck added following
 1. The programs are graded before their rejection, they are evaluated based on which track they are submitted
 2. Tony from CEC can be contacted to know on why a program was rejected
 3. The programs can also be rejected if there are excess submission

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4. Submitter should click on re-submission button while submitting a program, if was submitted previously and got rejected, this would give more priority to the program if it was rejected last time due to excess submissions

13. Membership subcommittee report (S. Kulankara)

- There are 95 members in the roster and quarter of them are YEA
- Number of voting members, total of 12, were confirmed
- Need to clean the roster for non-attending members
- D. Hoysall asked to be a voting member

14. MTG Liaison (S. Kulankara)

- MTG LowGWP had two meetings since last Annual conference. One on Wednesday in Toronto and second on Sunday in Atlanta
- At Toronto meeting, the MTG focused on codes and standards
- US ratified Kigali Amendment in October 2022, and new 2022 versions of supporting Standard 15, 15.2, and 34 have been published
- Standard 34 has 20 new blends and pure refrigerants
- Standard 15 is a safety standard that has provisions for A2 and B2 refrigerants, which needs stringent designs
- UL and product standard will be published for units that uses A2L refrigerants like standard 2-40
- MTG discussed and approved to have two seminar programs on safety codes and procedure to address the updates on Standard 15 and Standard 34
- Currently there are 3 ongoing research projects:
 1. RP-1806, Flammable Refrigerants Post-Ignition Simulation and Risk Assessment Update
 - Still running
 - Phase 1 report is complete, and PMS has addressed comments for PI
 - PI and PMS are working on phase-1 publication
 - Pilot draft report on the project will be created by PI, which will be used to make the go/no-go for Phase 2 and Phase 3
 2. RP-1855, Determination of the Impact of Combustion Byproducts on the Safe Use of Flammable Fluorinated Refrigerants
 - Draft report was submitted by PI to PMS
 - PI and PMS has some disagreements on the comments on the report
 - MTG gave conditional approval for publication as long as the PMS is satisfied
 3. RP-1884, The Incorporation of odorants in refrigerants to improve leak detection
 - TC 3.1 is responsible for this project and MTG is co-sponsoring
 - The project is out for bid

15. Chairman's report (A. Ayub)

- Technical Committees (TCs), Task Groups (TGs), and Technical Resource Groups (TRGs) will now be generally referred to as Functional Groups (FGs)
- FGs and MTGs (Multidisciplinary Task Groups) now have separate Manual of Procedures (MOPs)

16. New Business

- No new business was discussed

17. Schedule Next meeting: Monday, June 26, 2023– Tampa, FL, USA

- J. Huber asked if we should have next meeting at 2:30 pm, or request the old meeting time at 4:30 pm
- A. Ayub will contact all members to check for suitable meeting time

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18. Adjourn

- A. Ayub made a motion to adjourn, A. Knoepfler seconded.
- Adjourned at 4:15 EST

Attachments:

A –Meeting Slides Winter Meeting 2023

Welcome! TC 8.5 Liquid to Refrigerant Heat Exchangers

Welcome!

We will begin at **2:30 PM EDT**



Housekeeping

Audio

- Attendees are muted upon entry
- Do not un-mute your line
- If you are joining via computer and phone line, ensure both are muted

Video

- You are welcome and encouraged to share your webcam
- Be mindful that you are on display! Turn off your video when needed.

Q&A

- Use the chat function to ask questions
- Our speaker will pause throughout the presentation to answer questions from the chat box.

Adnan Ayub

Chair, Facilitator for this virtual meeting



TC 8.5 Call to Order and Reading of Scope

ASHRAE Technical Committee 8.5 Liquid to Refrigerant Heat Exchangers

TC 8.5 is concerned with the thermal and mechanical design, performance, and application of devices for accomplishing heat transfer between refrigerants (including secondary refrigerants) and liquids.



Adnan Ayub
Committee Chair



TC 8.5 Introduction of Members and Guests

Introduction of our members and guests...

- Please give your name and affiliation, and any TC 8.5 committee duties you have.
- In-person attendees will go first
 - Please be sure to note your attendance on the sign-in sheet.
- Online attendees will go next
 - Wait for a brief pause, and then speak. Remember to unmute before speaking, and then mute again after you have finished speaking.
 - Please send an email to TC0805@ashrae.net with subject “attendance 6/27” so we can log your attendance. Make sure the email contains your full name and please indicate if you are a YEA member.



Adnan Ayub
Committee Chair



ASHRAE Code of Ethics Commitment

- Our TC meeting will abide by the ASHRAE Code of Ethics:
- *Commitment to the ASHRAE Code of Ethics – 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.*
- Full Code of Ethics:
<https://www.ashrae.org/about-ashrae/ashrae-code-of-ethics>



Adnan Ayub
Committee Chair



ASHRAE Commitment to Care Statement

ASHRAE is committed to the health and safety of our members and conference attendees.

- Registration required
- Masks strongly recommended while indoors
- Color-coded lanyards available to indicate personal comfort level
- If you feel sick, join virtually

View the full Commitment to Care at [commitment-to-care.pdf \(ashrae.org\)](#)



TC 8.5 Establish Quorum – Current Voting Members

- Adnan Ayub (Chair, Handbook) '24
- Nicholas Zupp (Vice Chair) '25
- Pratik Deokar (Secretary) '26
- Vikrant Aute '23
(MTG LGWP Alt 1)
- Andreas Knoepfler '25
- Icksoo Kyung '24
- Minoo Mehdizadeh (Program) '24
- Stanislav Perencevic '23
- Pedro Perez (Webmaster) '24
- Khaled Hassan Saleh '25
- Nicholas Zupp (Secretary) '25
- Gurunarayana Ravi, '26
- Benjamin Dingel, '26

Voting Members roll off after June 30 of the year indicated



Adnan Ayub
Committee Chair



Other TC 8.5 Positions

- Satheesh Kulankara: Membership, MTG LGWP representative
- Kashif Nawaz: Research Subcommittee Chair



Adnan Ayub
Committee Chair



TC 8.5 Email Addresses

- Chair: TC0805@ashrae.net
- Vice Chair: TC0805.VCH@ashrae.net
- Secretary: TC0805.SEC@ashrae.net
- Handbook: TC0805.HBK@ashrae.net
- Program: TC0805.PRO@ashrae.net
- Research: TC0805.RES@ashrae.net
- Standards: TC0805.STD@ashrae.net
- Webmaster: TC0805.WEB@ashrae.net

The full list of aliases can be found on the Technical Committees page on the ASHRAE website



Adnan Ayub
Committee Chair



TC 8.5 Handbook

- TC 8.5 is responsible for Chapters 39 and 42 of the ASHRAE HVAC Systems and Equipment Handbook
- Final due date for submission: July 31, 2023
- Need to reach final vote for finalized edits in Annual Conference
- Edits to be done through the authoring portal (authoring.ashrae.org)
 - Need to email Jeri Alger (jalger@ashrae.org) for access
 - Will need a Microsoft email account
- Handbook in pdf version available through the technology portal of ASHRAE (technologyportal.ashrae.org)

Adnan Ayub
Handbook Subcommittee Chair



TC 8.5 Handbook

- Handbook Liasion (our chapters): Derek Crowe (derek.crowe@stantec.com)



Adnan Ayub
Handbook Subcommittee Chair



TC 8.5 Program



Minoo Mehdizadeh
Program Subcommittee Chair



Program Subcommittee Updates



- Hybrid conference, Feb 4-8
- 8 Tracks with a mixture of live and on-demand sessions, available for 18 months
- Seminars, Paper Session, Forum, Workshop, Round Tables
- Social events:
 - Welcome party
 - Fun run and walk
 - Companion meet & greet
 - Women in ASHRAE
 - Members night out

Program Subcommittee Updates

Winter Conference, Atlanta, GA, Feb 4-8, 2023

Tracks:

- Fundamentals and Applications
- HVAC&R Systems and Equipment
- Refrigerants and Refrigeration
- Grid Resilience and Thermal Storage
- Pathways to Zero Energy Emissions and Decarbonization
- Multifamily and Residential Buildings
- Operations and Maintenance
- Building Simulation and Virtual Design in Construction

Program Subcommittee Updates



TC 8.5 submitted programs for Winter 2023

- Seminar session
- Main Sponsor TC 1.3, Co-Sponsorship TC 8.5
- In-Tube Flow Evaporation and Condensation Performance of Low GWP Refrigerants ❌ Not Accepted

Program Subcommittee Updates

Summer Conference, Tampa, FL, June 24-28, 2023

Tracks:

- Fundamentals and Applications
- HVAC&R Systems and Equipment
- Research Summit
- Pathways to Zero Energy Emissions & Decarbonization
- Future-Proofing the Built Environment
- Building Automation and Control Systems
- Professional Development and Education

Deadlines:

- September 30, 2022
Technical Papers Due
- November 30, 2022
Conference Paper Abstract Due
- December 21, 2022
Conference Paper Abstract Accept/Reject
- February 24, 2023
Technical Paper Final Accept/Reject
- **February 27, 2023**
Other Programs Proposals Due
- March 29, 2023
Extended Abstract Paper/Conference Due
- April 14, 2023
Other Programs Accept/Reject
Notifications
- April 26, 2023
Conference Papers Accept/Reject
Notifications

Program Subcommittee Updates

Future Programs

- ASHRAE Summer Conference, June 24-28, 2023, Tampa, FL
- ASHRAE Winter Conference, January 20-24, 2024, Chicago, IL

Discussion

- Program Ideas for Future Summer and Winter Conferences

TC 8.5 Standards

TC 8.5 is responsible for the following Standards:

- ANSI/ASHRAE Standard 22-2018
Methods of Testing for Rating Liquid-Cooled Refrigerant Condensers
- ANSI/ASHRAE Standard 24-2019
Methods of Testing for Rating Evaporators Used for Cooling Liquids
- ANSI/ASHRAE Standard 181-2018
Methods of Testing for Rating Liquid to Liquid Heat Exchangers



Joe Huber
Standards Subcommittee Chair



TC 8.5 Standards

SPC-22 and SPC-181 have been formed to fix out-of-date references in Standards 22 and 181

(SPC = Standards Project Committee)

The SPCs are active, and plan to vote on Publication Public Review drafts later this summer.



Joe Huber
Standards Subcommittee Chair



TC 8.5 Standards

Standard 24-2019 is due for re-affirmation, revision, or withdrawal.

Issues with Standard:

1. Normative reference to ASHRAE Guideline 2 (Engineering Analysis of Experimental Data)
 - A. Guideline 2 has been withdrawn
 - B. Guidelines should not be referenced normatively, since they suggest practices and procedures, not mandate them
2. Have two other out-of-date references



Joe Huber
Standards Subcommittee Chair



TC 8.5 Standards

Item 1 requires revision, and cannot be fixed by ASHRAE Standards Revision Subcommittee (SRS); an SPC must be formed.

TC 8.5 can:

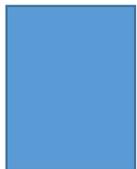
- Re-affirm Standard-24 as-is
- Recommend that ASHRAE form a Standards Project Committee to revise the Standards (recommended)
- Table the matter until the next meeting



Joe Huber
Standards Subcommittee Chair



TC 8.5 Webmaster



Pedro Perez
Webmaster



TC 8.5 Research



Kashif Nawaz
Research Subcommittee Chair



TC 8.5 Membership

Membership Housekeeping

- Aute, Perencevic rolling off as Voting Members (VM) after June 30
- Two voting members requested



Satheesh Kulankara
Membership Subcommittee Chair



TC 8.5 Membership

Provisional Corresponding Members

- Membership will expire
- Please send email ASAP if you wish to become a Corresponding Member
TC0805@ashrae.net



Satheesh Kulankara
Membership Subcommittee Chair



Low Global Warming Potential Multidisciplinary Task Group



Satheesh Kulankara
MTG Representative



TC 8.5 Chair Report

- **Activity form is used to produce a record of FG activities after each conference**
 - Due Tuesday, Feb 7th at 9 PM
 - Will need feedback from each subcommittee chair
- **Changes to TC MOP**
 - Major revisions to the MOP and separate the MTG into a separate MOP document
- **Addition of MTG MOP**
 - MTG now has a separate MOP document

Adnan Ayub
Committee Chair



TC 8.5 Chair Report

- **Deadlines for Annual Conference in Tampa**
 - **2/24/23: Tech. Paper final accept/reject notifications**
 - **2/27/23: Debate, Panel, Seminar Form, Workshop proposals**
 - **3/29/23: Extended Abstract Paper and Conference Paper**
 - **4/14/23: Debate, Panel, Seminar Form, Workshop accept/reject notifications**
 - **4/26/23: Conf. Paper Abstract accept/reject notifications**
 - **5/10/23: Revised Conf Paper, Tech Paper**
 - **5/21/23: Conf. Paper accept/reject notifications**



Adnan Ayub
Committee Chair



Concluding Remarks

- **Schedule Next meeting:**
Monday, June 26, 2023, Tampa, FL
- Adjourn



Adnan Ayub
Committee Chair

