



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

404-636-8400

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. 1.3 DATE February 7, 2023, 1-3 ET, LOCATION Tampa, FL

TC/TG/MTG/TRG TITLE Heat Transfer and Fluid Flow

MEMBERS PRESENT	END YEAR	MEMBERS ABSENT	END YEAR	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Kashif Nawaz	2023	Icksoo Kyung	2025	Michael Akinseloyin
Lorenzo Cremaschi	2024	Xiaofei Wang	2023	Kalyan Boyina
Melanie Derby	2026	Michael Wilson	2026	Min Che
Pratik Deokar	2025			Ryan Darragh YEA
Achim Gotterbarm	2026			Ben Dingel
				Bruno Y K de Carvalho
Gurunarayana Ravi	2026			Ahmed Elatar
Raymond Rite	2024			Brian Fricke
Omar Abdelaziz	2024			Brian Fronk
				Eckhard Groll
				Syed Angkan Haider
				Getu Hailu
				Yirong Jiang
				Arindom Joardar
				Amir Jokar
				Satheesh Kulankana
				Junjie Lao
				Jun Li
				Lingnan Lin YEA
				Liping Liu
				Muneeshwaran Murugan
				Bruce Nelson
				Michael Ohadi
				Kishan Padakannaya
				Stanislav Perencevic
				Pedro Perez
				Khaled Saleh

				SA Sherif
				Hessam Taherian
				Cheng-Min Yang
				Mingkan Zhang

1. Call to Order

Chair Nawaz called the meeting to order at 1:04PM ET

2. Introduction of members and guests

Introductions occurred in the room and for online participants. Chair Nawaz welcomed guests.

3. Establish quorum requirements (Kashif Nawaz)

Seven voting members were in attendance at the start of the meeting; quorum was established.

4. ASHRAE Code of Ethics Commitment (Kashif Nawaz) 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>.)

5. Review of Agenda (Kashif Nawaz)

Chair Nawaz shared the agenda online and distributed printed copies.

6. Review/Approve minutes from Winter 2023 meeting (Melanie Derby)

Motion (Rite/Cremaschi), passes 7-0-4

7. Section Head Comments (Corey Metzger)

This is Corey's last meeting as section head. Jason Atkisson will be taking over as Section Head of Section 1. Corey will still be active in ASHRAE and offered to help with questions. He asked the TC to submit activities forms ASAP. The TC brought up issues with a couple of roster items with its online roster and was directed to work with Tara at ASHRAE.

There is a new standing committee with a focus on global standards efforts. If interested in joining, please contact Stephanie at ASHRAE.

Kashif Nawaz was recognized with an Exceptional Service certificate, which was awarded at the meeting.

8. Liaison Comments

No additional liaison comments were given.

9. Membership Subcommittee (Achim Gotterbarm)

At the end of the month, Kashif Nawaz and Xiaofei Wang will roll of as voting members. They were thanked for their service. As of July 1, Vikrant Aute, Stefan Elbel, and Joe Huber will roll

on as voting members. It was noted that the TC is well balanced between industry and academics. It is proposed that Syed Angkan Haider will become Secretary of TC 1.3.

10. Handbook Subcommittee (Guru Ravi)

The handbook subcommittee is currently working on edits for TC 1.3's cognizant chapters. Khaled Saleh and Min Che also offered editing assistance. Please contact Guru if interested in editing or reviewing. He has been in touch with handbook liaison Sonya Pouncy.

Dr. M.M. Shah and Josua Meyer have already provided comments, and Amir Jokar also will provide comments. Many of the chapters edits are due March-May 2024. As we are getting closer to the deadline, we would like to vote on revisions/corrections during next winter meeting.

Subcommittee chair Ravi suggested meeting to discuss the changes between now and Chicago. Chair Nawaz thanked Subcommittee chair Ravi for his hard work and dedication to handbook edits.

There was some discussion of the $P-h$ diagrams in Chapter 30 with some differences compared to REFPROP 10, which is the purview of TC 3.1. Although the absolute values of enthalpy differ, the changes in enthalpy are the same and likely no action is needed. Ray Rite received a question about the Bernoulli equation (i.e., equations 9 and 10 in IP edition; question involves slugs) in Chapter 3 via email. There were no questions about SI edition.

11. Program Subcommittee (Pratik Deokar)

Seminar 17 was co-sponsored by TC 1.3, and sponsored by TC 8.5. The topic was in tube flow evaporation for low GWP refrigerants and it was reported there was good attendance for the seminar.

12. Status of other current/proposed programs

Looking ahead for the Chicago meeting in January 2024:

Prof. Michael Ohadi discussion a session focused around AI for decarbonization, including state of the art and future potential for next generation heat transfer, diagnostics, fluid flow, etc. An attendee mentioned that 1.4 was discussing this as well and it is expected to be a topic of interest. The decarbonized heat pumps and heat exchangers that were discussed last meeting will morph this into the heat exchangers and AI session.

Vote Forum TC1.3 (prime sponsor) on decarbonization and AI, Prof. Ohadi will coordinate. (Abdelaziz/Derby) passes, 7-0-4

Bruce Nelson discussed a potential forum regarding PFAS chemicals, which might impact working fluids for equipment depending on regulations. Chair Nawaz agreed this is a timely topic, and there was some debate on whether the LowGWP MTG or TC 3.1 may put together a range of PFAS programs (e.g., PFAS 101 to more complicated aspects of PFAS). It might be a good fit for the

ASHRAE expo. It was agreed the topic is important, but unclear whether it is a good fit for TC 1.3 to sponsor. Chair Nawaz suggested we cosponsor and, in the future, consider programs specific to PFAS and heat transfer. It was suggested that Omar Abdelaziz can connect with the LowGWP MTG.

Omar Abdelaziz mentioned that TC 1.1 is considering a program on high temperature heat pumps, and heat recovery up to 200 °C. It was unclear if speakers discuss boiling and condensation. It was suggested we could use an email ballot for co-sponsoring.

There was also discussion about a program on heat transfer with innovative novel surfaces. Five potential speakers have been identified and TC 8.5 voted to have first 3 speakers. It was noted that the database of evaporation and condensation heat transfer developed by Dr. Miyara could be interesting. It was suggested that TC 8.5 sponsor and TC 1.3 hold an email ballot to vote for co-sponsorship.

The deadline for programs is August 2, so there is still more than one month to prepare if needed and online ballots can be leveraged.

13. Webmaster (Lingnan Lin)

Webmaster Lin reported that he finally has access to the TC 1.3 website. He asked Secretary Derby to send him recent minutes to upload and also asked the TC for any ideas to modify the website.

14. MTG Liaison: Low GWP Refrigerants (Omar Abdelaziz -Liaison, Satheesh Kulankara –Alt#1, Evraam Gorgy–Alt#2)

The Low GWP MTG met on Sunday for its fifth year. PFAS is expected to be a hot topic in the next year, year and the EU proposal could have significant impact on synthetic refs. RP-1806 in stalemate, have not seen results yet, and RP-1855 is being finalized and will be discussed on Wednesday for closure

AHRI new project will consider material compatibility and stability, oil, construction material and low GWP refrigerants.

15. Research (Joe Huber)

a. Updates from the Society research meeting

Research Chair Huber shared an update from the research subcommittee chair breakfast on Tuesday morning. Zero RTARs submitted for review and TCs were strongly encouraged to write RTARs. Four contractor selections were made for four projects. Section 1 Ahmed Kashef will roll off, the new liaison will Dr Srinivas Katipamula. There were no nominations to Service to ASHRAE research this time and future nominations were encouraged.

The ASHRAE GIA for graduate students returned this year following a Covid-19-related hiatus; 20 applications were approved out of 43 submitted.

RAC funding increased from \$250k to \$350k due to inflation and post Covid 19, and the ASHRAE New Investigator Award was awarded again after a Covid-19-related hiatus.

There were 20 unsolicited research projects submitted, but several projects with no bids. There was concern expressed why people are not bidding. What is the disconnect? It is the topics? It is suggested that the amount of deliverables in the time frame may be a factor. It was also suggested that an audit/summary from URPs (e.g., duration and total cost of project) should be conducted in order and compare to work statements. Currently URPs are not going out back to TCs, but some interactions between them could be beneficial.

b. 1683-WS: “Experimental Evaluation of 2-Phase Pressure Drop and Flow Pattern in U-Bends with Ammonia”

PMS chair Ray Rite gave an update. Dr. Abbas and Dr. Cremaschi are the PIs for the project. Dr. Cremaschi presented research results. The ovality of u-bends was a topic of conversation. For very low temps, there were concerns with ammonia leakage through valve and compressor seals. An interim PMS meeting is planned for September with the PIs.

c. RP-1800: “Spray Evap. on Enhanced Tube bundles with low GWP Pure ref. and ref./miscible oil mixtures”

Zahib Ayub is the PMS chair and Lorenzo Cremaschi is the PI. Dr. Cremaschi gave the final presentation on Sunday afternoon. Experiments and correlation development is complete and the PMS is currently reviewing it. The PMS will make a recommendation, and then TC 1.3 will vote.

d. Co-sponsorship opportunities e. Pending research topics and future research plans

Work statement 1909 is in progress, focused on in tube condensing residential furnaces. RAC reviewed the work statement and returned it with comments. The work statement will be resubmitted. Based on the liaison’s comments, TC 1.3 may need to re-vote.

There have been no cosponsor opportunities lately.

Vikrant Aute is working on an RTAR for fluted tubes, which is ongoing.

There is interest in phase change heat transfer (e.g., boiling, condensation) with natural refrigerants. There is some interest in microchannel or microfin tubes, potentially with propane and isobutane. There are limited data with enhanced type tubes. There is potential for an RTAR. for tube diameters 7 mm and under.

Another topic of discussion was separation of immiscible oils in ammonia/ammonia liquid, which is especially important for ammonia refrigeration. TC 1.3 expressed interest in cosponsoring, and suggested TC 8.5 may be interested as well.

The TC was encouraged to share additional research ideas with Research subcommittee chair Huber via email.

16. Chair Comments (Kashif Nawaz)

Chair Nawaz shared notes from the chair’s breakfast. The TC activity forms need to be filled out and turned into TAC. ASHRAE is forming a decarbonization task force.

Chair Nawaz is rolling off and was thanked for his service. There will be a change in chair. Next meeting, Secretary Derby will assume role of chair. Mike Wilson will continue as Vice Chair for the next term. Syed Angkan Haider will become Secretary.

17. New Business

No new business was presented.

18. Next meeting: Chicago, IL

19. Adjourn 3:04PM at ET