

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

**1791 Tullie Circle, N.E./Atlanta, GA 30329
404-636-8400**

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 TC 1.3 DATE 25 April 2011

TC/TG/TRG TITLE Heat Transfer and Fluid Flow

DATE OF MEETING 1 February 2011 LOCATION Las Vegas, NV

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Lorenzo Cremaschi	2009	Rick Couvillion	2008	Omar Abdelaziz
Steve Eckels	2010	John Thome (non-quorum)	2008	Nacer Achaichia
Joe Huber	2007	Petur Thors	2010	Ebrahim Al-Hajri
Amir Jokar	2008			Zahid Ayub
Justin Kauffman	2009			Andreas Beutler
Branko Korenic	2009			Ben Dingel
Axel Kriegsmann	2009			Kevin Dunshee
Ken Schultz	2010			Erroll Eaton
Samuel Yana-Motta	2009			Bill Fox
				Steve Hancock
				Jon Hartfield
				Mark Holdinghausen
				Mike Ikeda
				Tony Jacobi
				Andrea Knoepfler
				Satheesh Kulankara
				Bruce Nelson
				Michael Ohadi
				Stanislav Perencevic
				Kent Perkins
				Ray Rite
				James Schaefer
				S.A. Sherif
				Ward TeGrotenhuis

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DISTRIBUTION

<i>All Members of TC/TG/TRG plus the following:</i>	
TAC Section Head: Victor Penar	
TAC Chair: Charles Wilkin	
All Committee Liaisons As Shown On TC/TG/TRG Rosters:	
Manager Of Standards	Stephanie Reiniche
Manager Of Research & Technical Services	Mike Vaughn



ASHRAE TC 1.3 – Heat Transfer and Fluid Flow Winter Meeting, 1 February 2011 (Las Vegas, Nevada)

Introductions (B. Korenic)

Branko Korenic called the meeting to order at 1:03. He then read the title, purpose and scope of the TC and solicited changes to the proposed agenda. There were no changes proposed. Following this, those present introduced themselves.

Confirmation of quorum (B. Korenic)

Eight of twelve voting members were present. One member absent was non-quorum, so the quorum was established with eight of eleven members.

Members present: Cremaschi, Eckels, Huber, Kauffman, Korenic, Kriegsmann, Schultz and Yana-Motta (Jokar arrived after quorum was established).

Members absent: Couvillion, Thome (non-quorum), and Thors.

Approval of the Minutes from the previous meeting in Albuquerque, NM

Joe Huber moved to approve the minutes as submitted. Steve Eckels seconded the motion. The motion passed by a vote of eight for, none opposed, none abstained (8-0-0). Amir Jokar then arrived, bringing the count to nine voting members present.

Liaisons' Comments (B. Korenic)

Victor Penar is the section head. He suggested that TCs should be sure to keep track of members rolling off and rolling on to ensure appropriate committee membership. He reminded the committee that the roster is due Tuesday evening. He also noted that the summer meeting is in Montreal, Canada, and suggested that members ensure that passports are up-to-date.

Report from Membership Sub-Committee Chair (J. Harfield)

Jon Hartfield noted that the committee currently has twelve voting members with five from academia and seven from industry. A survey was sent to the membership to ensure that corresponding members are still interested in committee activities. Twenty-nine members responded and four requested to be removed from the corresponding member list. There are two members rolling off as voting members July 1, 2011: Huber and Korenic. There are three new voting members rolling on as of July 1, 2011: Al-Hajri, Ayub, and Brown. As of July 1, 2011, the chair will be Yana-Motta. It was decided that Kauffman will remain as secretary to ensure that he is not concurrently vice-chair or chair of TCs 8.5 and 1.3. The vice chair will be Jokar. Cremaschi volunteered to become program chair when Jokar rolls on as vice chair.

Report from Program Sub-Committee Chair (A. Jokar)

TC 1.3 submitted two programs for Las Vegas.

- **Seminar: Micro-Nano fluids and systems in HVAC&R**
This was a new program was accepted for Las Vegas and presented as Seminar 44.
- **Forum: Low GWP Refrigerants: Current Status and Future Path.**
This program was not accepted for Las Vegas. Korenic made a motion to resubmit for Montreal. Eckels seconded, and the vote passed with nine for, none opposed, none abstained (9-0-0).

Future programs

- **Forum: Low GWP Refrigerants: Current Status and Future Path.**
See comments above, resubmitted for Montreal.
- **Seminar: Advances in Heat Transfer and Fluid Flow**
The seminar will be proposed for Montreal with TC 8.5 lead and TC 1.3 cosponsor. The seminar will feature recent research from Thome (RP-1444) and Eckels (RP-1316).
- **Seminar: Advances in Brazed Plate Heat Exchangers**
This seminar will be proposed for Chicago with TC 1.3 lead and TC 8.5 cosponsor. The seminar will feature a presentation by Jokar, Khan or Ayub (combination of RP-1394 and RP-1352) and Cremaschi (RP-1345).

ASHRAE is working to improve the conference paper session. There is no need for TC sponsorship of conference papers. Ayub suggested that the committee not spend too much time on conference papers because TC sponsorship is not required for conference papers and researchers are not inclined to present their work in conference papers because it is not as strong as publishing in the HVAC&R journal.

Report from Handbook Sub-Committee Chair (R. Couvillion)

Dr. Couvillion was unable to attend. Michael Ohadi reported that the committee is assembled and the chapters are on schedule for 2013.

Report from Webmaster (E. Al-Hajri)

Ebrahim reported that the website is up to date with roster, program, projects, and future ideas. Ebrahim suggested that if others wish to add information that they can simply contact him.

Report from Research Sub-Committee Chair (J. Huber)

The Service to ASHRAE research award was given to Steven Taylor. ASHRAE has several grants available including \$10k student scholarships, \$50k new investigator awards and the Homer Adams award for \$5k to a former graduate student ASHRAE researcher. The 2011 research budget is \$1.3 million and there are twenty-three approved projects but only eighteen will go out in the spring and the rest will go out for bid in the fall. There is a new research avenue called a multi-disciplinary task group, or MTG, that should better handle cross-functional research. MTGs are also hoped to help provide outside funding. RP-1596 was presented as an example of a successful MTG project.

Current Research

- **RP-1352 – Evaporation in Corrugated Plate Heat Exchangers with Ammonia and Ammonia/miscible oil (PI: S. Khan, PMS Chair: Z. Auyb).**
The final report was completed and approved by email ballot in November 2010. All necessary information has been submitted.
- **RP-1444 – Experimental Evaluation of Two-Phase Pressure Drop and Fluid Flow Patterns in U-bends for R134a, R410a, and Ammonia (PI: J. Thome, PMS Chair: B. Nelson).**
All data has been gathered and the researchers have begun correlating the data via a flow-pattern model, but the model is still being refined. The project is expected to be complete before the next meeting. The intention is to submit a thesis with an ASHRAE cover letter as the final report. Because ammonia was removed from the research (with TC and PMS approval), Bruce Nelson questioned the process for removing ammonia from the title of the project. Joe Huber volunteered to research the process.

- **RP-1327 – Flow Regime and Pressure Determination for Two-Phase Ammonia upward flow in various riser sizes (PI: Lars Reinhold, PMS Chair: G. Grace).**

TC 1.3 is a cosponsor with TC 10.3 leading the research. Gary Price is the liaison. Lars Reinhold presented on Sunday and noted that a number of test stand issues have been overcome and data collection is well under way. Flow visualizations were presented at the research review meeting. Additional data needs to be collected and models developed.

ASHRAE New Investigator Awards

- **Using micro-scale anisotropic surface chemistry to manipulate condensate droplets on aluminum (PI: A. Sommers)**

Dr. Sommers was unable to attend the meeting but provided a progress report. The project is on schedule with Phase I complete. Phase II is underway with the objective of measuring thermal performance of prototype coils under both dry and wet conditions and to assess the durability and longevity of the anisotropic, coated fins. The report is available upon request from Joe Huber or Justin Kauffman.

- **Heat Transfer and Fluid Flow of Nanofluids in micro and mini channel heat exchangers. (PI: A. Jokar)**

Dr. Jokar is continuing his research with single-phase flow to assess CFD results in corrugated plate heat exchangers. ASHRAE recommends an industry partner to assist with completion of new investigator projects.

Long-Range Research Plan

- **WS-1556 – Characterization of liquid refrigerant flow emerging from a flooded evaporator tube bundle” (J. Hartfield).**

None of the 18 projects approved are being funded this spring. Joe Huber spoke with Mike Vaughn to determine why the project was not funded, and suggested that improvements are needed for the project points status. Satheesh Kulankara will attend the RAC meeting to raise awareness about this project.

Other topics of interest.

- **Two-Phase NH₃ flow through tees and u-bends.**

Bruce Nelson will work toward completion of an RTAR by 15 May, which will require an e-ballot before next meeting.

- **Low mass-flux correlations for in-tube boiling of NH₃.**

No progress.

- **Heat transfer performance of new low GWP refrigerants.**

As a committee, we do not feel that we are yet prepared to begin this work. Ken Schultz will contact interested TCs to discuss an RTAR.

- **Particle fouling for in-tube flow of CO₂ sequestration equipment (M. Ohadi).**
- **Heat Transfer and Pressure Drop correlations of refrigerant mixtures in low-temperature applications (M. Ohadi).**
- **The effects of fouling on airside droplet condensation in heat exchangers (Eric Rats).**
- **Effect of Dust on Fouling of air side heat exchangers.**
- **Heat Transfer enhancement with micro encapsulated phase change materials.**
- **Nanofluids in HVAC.**
- **Mass transfer effects of differing surface energy (S. Yana-Motta to send info to B. Nelson).**

- **Investigation of airside fouling on outdoor condensing heat exchangers.**
This is a TC 8.4 RTAR. TC 8.11 has been asked to cosponsor. Samuel asked if TC 1.3 was also interested in co-sponsorship. Samuel will provide information to Joe Huber and the committee.
- **Heat and mass transfer of evaporative liquid condensers**
Branko suggested this topic, including testing on tube arrays (circular or non-circular) to fill in the gaps in existing research. This topic would also be of interest to TCs 8.4 and 8.6. Branko will work with the other committees and Jon Hartfield volunteered to help.

New business (B. Korenic)

No comments.

Announcements from TC Chairs' Breakfast Meeting (B. Korenic)

- TCs are being encouraged to work together and take on larger projects with broadened scope.
- The Hightower award was presented to Gary Peckenplace.
- Rosters are due Tuesday evening.
- Meeting minutes are due one month after the meeting.
- Continuing education credits are now granted via badge scanning rather than sign-in.

Adjourn.

Branko Korenic moved to adjourn the meeting. Axel Kriegsmann seconded. The motion passed with a vote of nine for, none opposed, none abstained (9-0-0). The meeting adjourned at 3:35.