

**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 8.5 DATE Jan 31, 2011

TC/TG/TRG TITLE Liquid to Refrigerant Heat Exchangers

DATE OF MEETING Monday, Jan 31, 2011 LOCATION Las Vegas, NV

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Ben Dingel	2010	James Bryan	2010	Evraam Gorgy
Petur Thors	2009			James Schaefer
Joe Huber	2009	<i>Corresponding Members:</i>		Eduardo Nunez
Amir Jokar	2010	Ty Newell	2005	Jacob Wagner
Satheesh Kulankara	2008	Josua Meyer	2005	Bo Shen
Zahid Ayub	2008	Parviz Payvar	2008	Bill Fox
Andreas Knoepfler	2008	Mahesh Valiya-Naduvath	2008	John Hartfield
James Bogart	2010	Jamal Yagoobi	2010	Sultan Khan
Steve Eckels	2010	Olivier Pelletier	2004	Roger Hartcell
Omar Abdelaziz	2010	Michael Taras	2009	Kent Perkins
		Dan Kihm	2009	Karine Brand
<i>Corresponding Members:</i>		Harry Li	2009	George Baker
Axel Kreigsmann	2008	Arthur Fovargue	2009	Serguei Dessiatoun
Ebrahim Al Hajri	2010	Avinash Gholap	2010	Scott MacBain
Stanislav Perencevic	2009	Michael Ohadi	2001	Satyam Bendapudi
Justin Kauffman	2010	Thomas Ortiz	2008	Sankar Padhmanabhan
Andreas Beutler	2009	Keith Starner	1993	
William McQuade	2002	Fliza Walters	2010	
Jeb Schreiber	2009	Charles Wilkin	2010	
Kash Oza	2010	Nathan Hart	2008	
Lorenzo Cremaschi	2010	Richard Hermans	2009	
Ken Schultz	2010	John Clark	2010	
Samuel Yana-Motta	2009	Martin Dieryckx	2009	
		Stephanie Reinihe	2009	
		Michael Vaughn	2001	

**DISTRIBUTION**

*All Members of TC/TG/TRG plus the following:*

TAC SECTION HEAD:	<b>William McQuade</b>
TAC CHAIR:	<b>Charles Wilkin</b>
ASHRAE MANAGER OF RESEARCH AND TECHNICAL SERVICES:	<b>Michael R. Vaughn, P.E.</b>

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

Approved Minutes

Technical Committee 8.5

Liquid-to-Refrigerant Heat Exchangers

Jan 31, 2011

2011 ASHRAE Winter Conference, Las Vegas, NV, Jan 29 - Feb 4, 2011

**1. Call to Order and Reading of TC8.5 Scope**

Chairman Ben Dingel called the meeting to order at 4:20 pm. He then read the scope of TC 8.5: "TC8.5 is concerned with the thermal and mechanical design, performance, and application of devices for accomplishing heat transfer between refrigerants (including secondary refrigerants) and liquids. Such devices include liquid cooled refrigerant condensers and refrigerant evaporators for cooling liquids".

**2. Introduction of Members and Guests (Sign attendance sheet)**

Members and guests introduced themselves. Please note that attendees should provide their email address on the circulated sign-up sheet at the meeting if they want to be assured of receiving committee meeting minutes. The following were present:

Ben Dingel	Trane
Petur Thors	Wolverine Tube, Inc.
Joe Huber	Alfa Laval
John Thome	EPFL
Amir Jokar	Vacom Technologies
Satheesh Kulankara	York
Zahid Ayub	Isotherm, Inc.
Andreas Knoepfler	Wieland-Werke AG
James Bogart	Alcoil, Inc.
Steve Eckels	KSU
Omar Abdelaziz	Oak Ridge National Laboratory
Axel Kreigsmann	Wieland-Werke AG
Ebrahim Al Hajri	Petroleum Institute
Stanislav Perencevic	Guntner AG & Co. KG
Justin Kauffman	JCI
Andreas Beutler	Wieland-Werke AG
William McQuade	JCI
Jeb Schreiber	JCI
Kash Oza	Alfa Laval
Lorenzo Cremaschi	Oklahoma State University
Ken Schultz	Trane
Samuel Yana-Motta	Honeywell
Evraam Gorgy	Kansas State University
James Schaefer	HTRI
Eduardo Nunez	McQuay International
Jacob Wagner	Kansas State University
Bo Shen	Oak Ridge National Laboratory

Bill Fox	Trane
John Hartfield	Trane
Sultan Khan	GIK Institute
Roger Hartcell	National Technical Systems
Kent Perkins	Colmac Coil Mfg
Karine Brand	Wolverine Tube, Inc.
George Baker	Modine Mfg
Serguei Dessiatoun	University of Maryland
Scott MacBain	Carrier
Satyam Bendapudi	Carrier
Sankar Padhmanabhan	JCI

**3. Establish Quorum Requirements**

Voting members present were: Ben Dingel, Zahid Ayub, Satheesh Kulankara, Joe Huber, Steve Eckels, Andreas Knoepfler, Omar Abdelaziz, Petur Thors, Jim Bogart, Amir Jokar, and John Thome. Voting member(s) absent was (were): James Bryan. With eleven of twelve voting members present, the quorum was satisfied.

Votes below are listed as [for-against-abstain] and should add up to eleven.

**4. Review/Approve Previous Meeting Minutes**

Minutes from the previous meeting (Albuquerque) were circulated prior to the meeting. The chairman Ben Dingel moved the motion to “Approve the minutes of the Albuquerque meeting” and Satheesh Kvlankara seconded the motion. The committee voted [11-0-0] to approve the minutes as circulated. Meeting minutes will become official and re-circulated.

**5. Chairman’s Comments**

Chairman Ben Dingel informed the TC on the issued and matters discussed at the morning Chair Meeting session. Below is what the TC Chairman has shared with the TC:

- Deadlines:
  - Rosters:
    - The deadline to have rosters ready for distribution to the TCs by the end of April.
    - Tuesday, February 1 – TCs should turn-in the first draft of their completed roster update workbook to their section head for review and approval.
    - February 15 to 28 - The final draft of all roster update workbooks must be approved by section head and turned into staff for processing during this period.
    - March to May – Section head works with staff and TC to finalize 2011-2012 rosters so that they can be distributed to TCs by May 1st.
  - Research:
    - Sunday, May 15-RTARs and New or Revised Work Statements for action at the Annual Meeting
  - Awards:
    - Sunday, May 1st- Distinguish and Exceptional Service Award Submission Deadline
  - TC Management:
    - Tuesday February 1- Submit TC Activity Sheet by 9 PM
    - Thursday, March 9th- Request Subcommittee Space for Annual Meeting

- Friday April 1- Distribute Draft Minutes from Winter Meeting to Membership
- Sunday, May 22 – Distribute meeting agenda for Annual Meeting

- Distinguished Service Award

This award recognizes members of ASHRAE who have served the Society faithfully and with distinction on committees or otherwise given freely of their time and talent on behalf of the Society (15 service points are required).

- A completed DSA/ESA Point Tally Form (Available at [www.ashrae.org/honors](http://www.ashrae.org/honors)), a digital photo of the nominee, and a current ASHRAE Biographical Record must be submitted with each nomination
- Members may be nominated by other members, chapters, regions, committees, or may nominate themselves.
- Recognition is in the form of a plaque and lapel pin
- No limit on number awarded per year
- Deadline for nomination: May 1

- Exceptional Service Award

This award recognizes members who have served the Society faithfully and with exemplary effort, far in excess (45 service points) of that required for the Distinguished Service Award (15 service points). The individual must have been a full grade Member for a minimum of ten years and be a past recipient of the Distinguished Service Award.

- A completed DSA/ESA Point Tally Form (Available at [www.ashrae.org/honors](http://www.ashrae.org/honors)), a current ASHRAE Biographical Record, and a digital photo of the nominee must be submitted with each nomination.
- Recognition is in the form of a plaque and lapel pin
- Members may be nominated by other members, chapters, regions, committees, or may nominate themselves.
- Maximum twenty awarded per year
- Deadline for nomination: May 1
- Awards are presented at Annual Society Meeting

- Modification of MOP

The chairman of the TC notified the Committee on the modifications to the MOP to include concept of Multidisciplinary Task Group. One of ASHRAE President Lynn Bellinger's objectives is to increase the communication of TC to TC communications and therefore the technical range of projects that TCs can address. The BOD and Tech Council have previously created special groups to address key issues for ASHRAE. Since two of these have matured to the point that they need to be established in a formal ASHRAE committee structure, TAC has been asked to modify the MOP and support the MTG development. (Example is the BIM and Building Performance Metrics Project Committees) Concept: A "Multidisciplinary Task Group" would provide the structure to allow TCs to voluntarily join together to address a specific major issues that encompass their TC missions. There may be different MTGs that would address different issues. Each MTG would be formed under TAC administration and would decide the appropriate scope and mission for that MTG. The membership would be composed, represented and managed by the involved TCs. Each MTG would decide the functions that it would address, which could include Handbook, Program, Publications, Research and Standards. For example, a MTG could provide a structure for multiple TCs to address a much larger research project which requires the expertise of several TCs. MTGs are intended to be temporary committees which address a specific major

issue identified by the Society and as such are formed for a finite time, currently 3 years. MTGs must be renewed by TAC to continue.

At the TAC meeting on Saturday changes to the TAC MOP were approved that will provide for the formation and administration of MTGs. This will now go to Tech Council for final approval.

**6. Section Head Comments**

Section Head Bill McQuade had no comments. He asked if the TC had any concerns and offered to assist in any way he can.

**7. Comments from Liaisons (Handbook, Standards, Journal, Research, Program, TEGA, Technical Services, Refrigeration)**

No liaisons were present.

**8. Handbook Subcommittee Report**

Subcommittee chair Jim Bogart gave an update on the status of the Handbook Chapters that are being reviewed and pointed that the work is on time compared to the status of the Handbook Chapters in the Albuquerque Annual meeting. The TC suggested modifying the System and Equipment Chapter 38 in the Handbook. Ben moved the motion to approve modification to chapter 38 and Zahid seconded the motion. The committee voted [11-0-0].

**9. Program Subcommittee Report**

The Chairman of the TC, Ben explained to the TC the different program types that can be offer in ASHRAE Annual and Winter meeting (Technical Paper, Conference paper, Seminars and Forums) and that a TC can form a session if the TC has a sufficient amount of papers to submit. The submissions for a seminar session have changed and the Subcommittee chair Omar Abdelaziz has pointed the new changes to the TC. The changes are also available on ASHRAE's website.

Subcommittee chair Omar Abdelaziz reported that there are no plans for any programs for Montreal or Chicago. Amir Jokar suggested submitting a program (seminar) for Montreal that consists of the previous and/or ongoing research projects that are sponsored by TCs 8.5 & 1.3. There were five potential speakers who showed interest to participate amongst who are, John Thome, Steve Eckels, Lorenzo Cermaschi, Amir Jokar and Sultan Khan. Zahid Ayub suggested that each TC (TC8.5 & TC1.3) sponsor a program in the Montreal. The TC agreed to sponsor a program in Montreal and Amir Jokar will submit another program which will be sponsored by TC 1.3. Both program titles and names of speakers are shown below:

Program sponsored by TC 1.3: Advances in Two-Phase Flow

Speakers: John Thome, Steve Eckels and **Lars**

Program sponsored by TC 8.5: Advances in **Brazed** Plate Heat Exchanges

Speakers: Sultan Khan, Amir Jokar and Lorenzo Cermaschi

Upcoming Program Submission Dates:

Montreal Meeting - June 25-29, 2011

- Theme: Net-Zero Buildings
- Montreal Seminar and Forum Sessions are due February 14, 2011
- Full Technical Papers & Conf. Paper abstracts are due March 7, 2011
- Conference Website with Track Grid: [www.ashrae.org/montreal](http://www.ashrae.org/montreal)

Chicago Meeting - January 21-25, 2012

- Theme: The Impact of HVAC&R on our Daily Lives

- Full Technical Papers & Conf. Paper abstracts are due April, 18, 2011
- Chicago Seminar and Forum Proposal accepted starting June 3, 2011
- Conference Website: [www.ashrae.org/chicago](http://www.ashrae.org/chicago)

**10. Membership Subcommittee Report**

Subcommittee chair Kash Oza updated the TC on the voting and corresponding members of the TC.

Ben Dingel has sent a reminder to all the members asking if they were still interested on attending the TC. The following people did not respond: Ty Newell, Olivier Pelletier, Jeb Schreiber, Mahesh Valiya-Naduvath and James Bryan. James Bryan is a voting member and has not been attending the TC meetings; therefore, a decision was made to change James' membership status to a corresponding member.

Ben pointed out that eight voting members will be rolling off in 2012. Lorenzo, Samuel and Ebrahim have shown an interest on becoming voting members on the next cycle. This will be affective after the Montreal meeting.

**11. Standards Subcommittee Report**

Joe Huber reported activity related to standards 22 and 181 for which the committee has responsibility.

Previously, the committee voted to revise this standard 22 (Methods of Test for Rating Condensers). The appropriate paperwork was submitted with names of interested users. AHSRAE requires that the standards subcommittees that are formed to revise a certain standard should have a balance of users, producers and researchers. ASHRAE has identified the submitted names are producers and suggested that a balance of different users is required. James Schaefer from HTRI and Lorenzo Cemaschi have shown an interest to help with the revision of the standard.

As for standard 181(Methods of Test for Liquid to Liquid Heat Exchangers), the majority previous committee members who were overlooking the standard revisions have resigned. Lorenzo and James Schaefer offered to help with the standard revisions.

**12. Journal/Insights/Webmaster Subcommittee Report**

Webmaster Joe Huber reported that he continues to update the committee website as needed, with no major changes noted. The URL for TC 8.5's website is: <http://www.tc85.ashraetcs.org/>.

**13. Research Subcommittee Report**

[Secretary's Note: Ken prepared a summary of TC8.5 research activities and circulated this via email (dated 2/15/2011) to the committee. Material reprinted from this email is highlighted in *italics* below (thank you - Ken).]

In addition to the discussion of specific research projects (see below), Research Subcommittee Chairman Ken Schultz reported on information shared at the Research Chair Breakfast.

*This year's "Service to ASHRAE Research" award went to Steve Taylor, a very active member on TC 4.3 (Ventilation Requirements and Infiltration).*

*ASHRAE granted 22 (out of 66 applications) "Grants-in-Aid" this past year - \$10K scholarships for graduate research. "New Investigator Awards" provide \$50K to support and encourage new researchers within five years of receiving their PhD to work in the HVAC&R field. The "Homer Adams Award" provides \$5K to a former graduate student who made a substantial contribution to research and publications.*

*Funding available for new research in 2011-2012 fiscal year is \$1.3M. There are currently 25 tentative research projects (TRP's). 17 will be released for bid in Spring 2011. The remaining 8 will be held for bidding in Fall 2011.*

*ASHRAE is encouraging the formation of "Multi-disciplinary Task Groups" (MTG's) that would have a broader mandate than TC's. The idea is that MTG's could more easily develop larger strategic research projects and more actively pursue funding outside of ASHRAE. An example is the recently awarded project 1596-RP, "Ventilation and Indoor Air Quality in Retail Stores". ASHRAE solicited a \$1.5M grant from NIST to make this happen. The project went out for bid through the standard process. Five bids were received with the Univ of Texas – Austin selected to do the work.*

Following is a summary of TC8.5 sponsored research projects and the status of each project.

#### Current Projects:

There are currently only two active research projects under the purview of TC 8.5. One project should be completed by the next meeting (Jun11 in Montreal) and the other should be completed within the next year (by Jan12 in Chicago).

#### 1316-RP: Experimental Evaluation of the Heat Transfer Impacts of Tube Pitch on a Highly Enhanced Surface Tube Bundle.

PI: Steve Eckels, Kansas State Univ.

PMS: Petur Thors (chair), Ben Dingel, Satheesh Kulankara, Axel Kriegsmann.

*Status: active (start date: Jan-2006. original target completion date: Jul-2008. extension #1 granted Salt Lake City mtg, Jun08: Jul-2009. extension #2 granted Louisville mtg, Jun09: Jul-2010. Extension #3 granted Albuquerque mtg, Jun10: Apr-2011. Extension #3B granted Las Vegas mtg, Jan11: Jun-2011.)*

The PI requested for a no-cost extension to allow enough time for the research group to submit the first draft report by May 2011. Petur has moved a motion to award an extension period to the project at no-cost until the end of June 2011. Votes are listed as [for-against-abstain: 9-0-0.

*Data collection for both refrigerants (R134a and R123) in the three bundles (P/D = 1.167, 1.33, and 1.50) has now been completed. The dominant effect on bundle performance is heat flux. In R134a, the shell-side heat transfer coefficients for the 1.33 and 1.50 pitches are similar to the pool boiling curve. The ho's for the 1.167 pitch are significantly lower. In R123, all three pitches show performance similar to the pool boiling curve. It was noticed that the ho's for the tightest pitch drop down to smooth tube levels when heat flux is high and quality is greater than 60%.*

*Data analysis continues. The final report is expected to be submitted by May.*

#### 1345-RP: Waterside Fouling Performance of Brazed-Plate Type Condensers in Cooling Tower Applications.

PI: Lorenzo Cresmaschi, Oklahoma State Univ.

PMS: Jim Bogart (chair), Art Fovargue, Axel Kriegsmann, Ken Schultz, Xudong Wang (ARTI cofounding).

*Status: active (start date: May-2008. Original target completion date: Oct-2010. extension #1 granted Albuquerque mtg, Jun10: Oct-2011.) Measurements of fouling resistance and pressure drop have now been completed for the four geometries with high fouling potential water. Measurements have also been completed on two of the geometries at the standard (105°F) and elevated (120°F) saturation temperatures.*

*Fouling resistances were roughly an order of magnitude lower for the “hard” angle geometries than for the “soft” angle geometry. The higher saturation temperature resulted in higher fouling resistances. The pressure drop measurements continue to suggest localized precipitation might be occurring at is causing blockage of the water flow channels.*

*Attention will now be turned to running tests with the medium fouling potential water.*

#### Future Research Projects

The topic of potential future research projects was discussed. Ken offered the following summary of this discussion:

Ken circulated in the meeting a document about an initiative by Navigant Consulting Inc on behalf of the US DOE and Oak Ridge National Laboratory to advance research on Low GWP Refrigerants.

*Satyam Bendapudi volunteered to begin writing an RTAR to revisit our work on fouling in enhanced chiller tubes. Justin Kauffman and Ben Dingel also expressed interest in helping with this. Previously, we have discussed adding a task to review how fouling is modeled/described today for chiller tubes and to recommend a revision if warranted. TC 8.2 (Centrifugal Machines) has also discussed sponsoring a project along these lines. TC 3.6 (Water Treatment) should also be a potential co-sponsor to any of our fouling studies.*

*In previous meetings, both TC 8.5 and TC 1.3 had discussed beginning to look at the new low GWP refrigerants being proposed by the chemical companies. This area continues to gain momentum. Joe Huber, TC 1.3 research chair, had made an initial attempt to contact other TC’s (3.1 – Refrigerants and Secondary Coolants, 8.4 – Air-to-Refrigerant Heat Transfer Equipment, and 8.11 – Unitary and Room Air Conditioners and Heat Pumps) that also have a vested interest in this topic. Joe acknowledged being tied up with other tasks (eg, Standards 22 and 181P, among others). Ken Schultz volunteered to pursue collaboration among the various TC’s and develop a roadmap of potential projects in this area.*

*Jim Bogart (via second-hand) said he is willing to begin work on an RTAR for studying fouling in tube-in-tube heat exchangers. At one time, AHRI had indicated they would consider co-funding this work; will need to check with them to see if they have continued interest and resource.*

*TC’s 8.1 (Positive Displacement Compressors) and 8.2 are working on a RTAR to study the safety issues related to applying “2L” (mildly flammable) refrigerants in HVAC&R equipment.*

*The next RTAR submission deadline is 15-May. To be submitted, RTAR’s must be approved by a vote of the committee. To provide sufficient time for reviewing, making revisions, and conducting an email ballot prior to the submission deadline, I’d suggest that any draft RTAR’s should begin circulating by 15-April. Otherwise, circulation of a draft RTAR by, say, 15-Jun would provide an opportunity for face-to-face discussion at the Montreal meeting with a submission deadline of 15-Aug.*

#### **14. New Business**

No additional items.

#### **15. Schedule Next Meeting**

The next committee meeting will be held on June 27<sup>th</sup>, 2011 at 4:15 – 6:30 PM in Montreal, Canada.

#### **16. Adjourn**

Following all discussions, the meeting was adjourned by majority vote [7-0-0] at 6:10 PM.