

**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 June 27, 2011

TC/TG/TRG TITLE Liquid to Refrigerant Heat Exchangers

DATE OF MEETING Monday, June 27, 2011 LOCATION Montreal, Canada

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Ben Dingel	2010	James Bryan	2010	Massoud Neshan
Petur Thors	2009	Zahid Ayub	2008	Rou Cosby
Joe Huber	2009	James Bogart	2010	Justin Piggush
Amir Jokar	2010			Achim Gottergarm
Satheesh Kulankara	2008	<i>Corresponding Members:</i>		Kent Perkins
Andreas Knoepfler	2008	Ty Newell	2005	Mohamed Al Shehhi
Steve Eckels	2010	Josua Meyer	2005	Rupal Choksi
Omar Abdelaziz	2010	Parviz Payvar	2008	Luke Luo
John Thome	2010	Mahesh Valiya-Naduvath	2008	Trevor Houck
		Jamal Yagoobi	2010	David Yushar
<i>Corresponding Members:</i>		Olivier Pelletier	2004	
Axel Kreigsmann	2008	Michael Taras	2009	
Ebrahim Al Hajri	2010	Dan Kihm	2009	
Stanislav Perencevic	2009	Harry Li	2009	
Justin Kauffman	2010	Arthur Fovargue	2009	
Ken Schultz	2010	Avinash Gholap	2010	
Samuel Yana-Motta	2009	Michael Ohadi	2001	
Scott MacBain	2009	Thomas Ortiz	2008	
James Schaefer	2010	Keith Starner	1993	
		Fliza Walters	2010	
		Charles Wilkin	2010	
		Nathan Hart	2008	
		Richard Hermans	2009	
		John Clark	2010	
		Martin Dieryckx	2009	
		Stephanie Reinihe	2009	
		Michael Vaughn	2001	
		Lorenzo Cremaschi	2010	
		Andreas Beutler	2009	
		William McQuade	2009	
		Jeb Schreiber	2009	
		Kash Oza	2010	

## 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>
ALL COMMITTEE LIAISONS AS SHOWN ON TC/TG/TRG ROSTERS:	Filza Walters — ALI/PDC Richard Hermans — RAC Research Liaison Nathan Hart — Chapter Technology Transfer Liaison John Clark – Special Publications Martin Dieryckx– Standards Liaison
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**AMERICAN SOCIETY OF HEATING, REFRIGERATION,  
AND AIR-CONDITIONING ENGINEERS, INC.**

Approved Minutes  
Technical Committee 8.5  
Liquid-to-Refrigerant Heat Exchangers  
June 27, 2011  
2011 ASHRAE Annual Conference, Montreal, QC, Canada, June 25 - 29, 2011

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

Chairman Ben Dingel called the meeting to order at 4:18 pm. He then read the scope of TC 8.5.

**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	Exponent, Inc. (Thermal Sciences)
Satheesh Kulankara	York
Andreas Knoepfler	Wieland-Werke AG
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
Ken Schultz	Trane
Samuel Yana-Motta	Honeywell
James Schaefer	HTRI
Scott MacBain	Carrier
Massoud Neshan	Souther Store Fixture Inc.
Rou Cosby	Ingersoll Rand – Trane
Justin Piggush	Ingersoll Rand – Trane
Achim Gotterbarm	Wieland Pine Hall
Kent Perkins	Colmac Coil
Mohamed Al Shehhi	Petroleum Institute
Rupal Choksi	AHRI
Luke Luo	Wolverine Tube Shanghai
Trevor Houck	SWEP
David Yashar	Nist

3. **Establish Quorum Requirements**

Nine of twelve voting members were present. The voting members present were: Ben Dingel, Satheesh Kulankara, Joe Huber, Steve Eckels, Andreas Knoepfler, Omar Abdelaziz, Petur Thors, Amir Jokar, and John Thome. Voting member(s) absent were: James Bryan, Zahid Ayub and James Bogart. With nine 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 (Las Vegas) were circulated prior to the meeting. Joe Huber moved the motion to “Approve the minutes of the Albuquerque meeting” and Omar Abdelaziz seconded the motion. The committee voted [9-0-0] to approve the minutes as circulated. Meeting minutes will become official and re-circulated.

5. **Chairman’s Comments** (Ben Dingel)

The chairman gave a brief update on the outcomes of the Chairs Breakfast Meeting and below is what the TC Chairman has shared:

- Submission deadlines for programs were outlined
- The CEC will be evaluating the speakers in an effort to improve programs offered in the conference and ASHRAE was soliciting ideas from members on ways to rate speakers and programs. The TC members agreed that each TC should be responsible to evaluate the program and speakers. In addition, the no show presenters have to be held accountable.
- The chairman requested that whomever is interested to serve as a session chair or a reviewer to give their names to him to forward them to ASHRAE
- ASHRAE is interested on creating Multi-Disciplinary Task Groups to allow collaboration between TCs/TGs to work in similar areas of interest.
- The chairman informed the TC members on the new roster process that ASHRAE has put in place which will be effective before the next meeting. The TC roster can be accessed online and on the TC website for those who want to know their member status in the TC.
- Any award nomination submissions should be done through the TC chair. The different awards and their relative criteria were presented by the chair. The chair encouraged the members who are interested and qualified to apply for the awards and he showed his willingness to assist the nominees.

6. **Section Head Comments** (Bill McQuade)

The Section Head gave positive comments about the TC’s performance, activities and the effort put in place from the members of the TC.

Ben conveyed to the Section Head the members’ concerns on the way ASHRAE prioritizes and evaluates the programs that are submitted from members and TCs. The TC suggested to have a track on HVAC&R Journals be presented at every meeting during the TC’s Research Meeting Session, where the journals to be presented in these meetings shall be picked by the TC.

Bill praised the suggestion and agreed to find out the process on how the suggestion above can be implemented.

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

No liaisons were present.

8. **Handbook Subcommittee Report** (Jim Bogart)

Subcommittee chair was not present at the meeting; therefore, no updates were recorded.

9. **Program Subcommittee Report** (Omar Abdelaziz)

The Subcommittee chair gave a summary on the TC Program Chair Meeting where he shed light on the changes made on the type of programs that TC can organize. ASHRAE has classified the programs to 4 main programs as follow: Technical Papers, Conference Papers, Seminars and Forums. Where Technical Papers were previously called Transaction Sessions and require the approval from the TC and CEC. Conference Papers not require to be approved by the TC and can be organized by either CEC or TC into sessions. Seminars and Forums are organized by TCs (NO changes from the previous years).

Subcommittee chair Omar Abdelaziz reported he has submitted a program with the title "Advances in Two-Phase Flow". The program was not approved due to the large number of programs submitted for Montreal.

ASHRAE suggested holding programs that are not approved by the CEC during the TC meeting time or in TC Research Meeting Session time.

There was a concern that a journal paper that was submitted by Steve Eckels was presented in a program that was sponsored by TC 1.4. Our TC was not notified or even consulted before using the paper in the program.

The committee discussed the possibility to organize a program for Chicago titled "Advances in Brazed Plate Heat Exchangers" with a possibility of TC1.3 to co-sponsor the program.

Ben also suggested submitting another program in the form of a Forum at the same time slot of the Research Meeting for TC 1.3/8.5 which is usually held on Sunday afternoon. The proposed Forum title is "Low GWP Refrigerant Research Efforts". Omar has agreed to look for interested participant speakers for the forum, and then will submit the program to ASHRAE.

Ben asked Ken, Omar and Joe to draft the objective and outcomes write up for the forum and all three agreed to take on the task.

10. **Membership Subcommittee Report** (Kash Oza)

The subcommittee chair was not present at this meeting. The chairman gave an update on the new roster for next year and with 14 voting members whom names are listed below: Ben Dingel, Joe Huber, James Bogart, Ebrahim Al Hajri, Zahid Ayub, Omar Abdelaziz, Lorenzo Cremaschi, Steve Eckels, Amir Jokar, Samuel Yana-Motta, Andreas Knoepfler, Satheesh Kulankara, John Thome and Petur Thors.

11. **Standards Subcommittee Report** (Joe Huber)

[Secretary's Note: Joe prepared a summary of TC8.5 standard subcommittee activities and sent me the report via email (dated July11th 2011). Material reprinted from his email is highlighted in *italics* below (thank you - Joe).]

Joe Huber reported activities related to standards 22 and 181 for which the TC is responsible. Below is his report. (Thank you Joe for providing the report below)

SPC-22 (Method of Test for Liquid-cooled Condensers) conducted its first meeting via teleconference on April 12, 2011. The committee also met at the 2011 Annual Conference on Sunday June 26 from 10:00 AM to 12:30 PM. Several substantive changes are being made to the standard:

- 1) Mandatory language is being implemented throughout the standard.
- 2) The standard is being changed to reflect that fluids other than water may be used to cool the condenser (i.e. water-cooled being changed to liquid-cooled).
- 3) Enthalpy values will be based on temperature and pressure measurements, and text will be added indicating how to correct enthalpy for pressure effects.
- 4) Uncertainty analysis is being added, similar to what is occurring with other ASHRAE standards.
- 5) The standard is being updated to better deal with zeotropic refrigerants.
- 6) The title, purpose and scope have been updated.

The committee is making good progress and hopes to have a public review draft available in approximately six months.

SPC-181P (Method of Test for Liquid-to-Liquid Heat Exchangers) conducted a meeting via teleconference on March 30, 2011. The committee also met at the 2011 Annual Conference on Monday June 27 from 2:15 to 4:00 PM. The committee is working to finalize the basic outline of the standard, and putting content to the outline. A major task has been to determine what calculated parameters need to be reported in order to adequately and accurately characterize the performance of a liquid-to-liquid heat exchanger. The committee hopes to have a public review draft available in approximately one year. The committee is also working to make standard 181 consistent with Standard 22 and Standard 24, for which TC 8.5 is also cognizant.

Tom Carter, who recently retired from Baltimore Air Coil and subsequently took a job with Johnson Controls, submitted his resignation to both SPC-22 and SPC-181P just prior to the annual meeting, stating that there would be a conflict of interest with other committee members now that he works for Johnson Controls. Tom was a voting member in the "User" category on both committees, and the secretary of SPC-181P. As there is already a voting member on SPC-22 from Johnson Controls, Tom could not be voting member on SPC-22. However, there are no voting members from Johnson Controls on SPC-181P. Joe Huber is trying to contact Tom in order to encourage him to remain on SPC-181P. Also, as Tom was the only member from the "User" category on each committee, both committees are no longer in balance regarding "Producer", "User", and "General Interest" members. The committees are investigating whether any current members can be categorized as "User" members. If not, the committees will need to find additional members that fit the "User" category.

**12. Journal/Insights/Webmaster Subcommittee Report (Joe Huber)**

The website is up to date. All thanks go to Joe for keeping the webmaster in shape. The URL for TC 8.5's website is: <http://www.tc85.ashraetcs.org/>.

**13. Research Subcommittee Report (Ken Schultz)**

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

*The joint TC 1.3/8.5 Research Review Meeting was held on Sun 26 Jun, 3:00pm-5:20pm, with about 25 attendees, and the TC 8.5 Committee Meeting was held on Mon 27 Jun, 4:15pm-6:30pm, during the 2011 Annual Meeting in Montreal.*

**ACTIVE PROJECTS**

*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 draft final report is in the last stages of completion. The final report consists primarily of the PhD thesis by student Evraam Gorgy. The thesis was successfully defended and has been reviewed by a technical editor. [Post-meeting: The original draft report (as sent to the technical editor) was delivered by email to the PMS and MORTS on 30-Jun to meet the impending (extended) end date for the project.]

The PMS is to review the draft final report in a timely manner and will address any questions and comments back to the PI with respect to contract deliverables. When outstanding issues are resolved, the PMS is to submit a recommendation to the full committee. An email ballot will then be conducted. Petur will then fill out and submit the Disposition of ASHRAE Research form.

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.)

Testing has now been completed for the A1 (soft) and A2 (hard) geometries with medium fouling potential water (at 105°F) and at the elevated refrigerant saturation temperature (120°F) with high fouling potential water. The data are all relatively consistent, although some questions exist regarding the very first test of the A1 (soft) geometry with high fouling potential water. The fouling resistance appears to be somewhat elevated during early testing.

To address this question, the first test will be repeated as a check. The test will be run only as long as necessary. The PI has also acquired a straight tube-in-tube (smooth inside) heat exchanger and will test this to provide a link between the BPHE testing done here and possible future testing of straight tubes (smooth and enhanced). Delivery of the draft final report is targeted for the end of October.

### FUTURE PROJECTS

The completion of the above two projects will leave TC 8.5 with no on-going research projects. We are in need of new research ideas turned into RTAR's. (TC 1.3 is also in a similar position. On-going research projects have all been completed. 1556-TRP is ready and waiting in the queue to go out for bids.)

Jim Bogart is working on a draft RTAR entitled "Waterside Fouling Performance of Coiled-Tube Type Condensers in Cooling Tower Applications". We are working to come up with some measure or indicator of the importance of fouling to the performance of equipment using coiled coaxial heat exchangers. The draft RTAR should be ready for distribution to and review by the committee shortly. TC 3.6 might be interested in cosponsoring such work. Some time back, AHRI was interested in co-funding this work.

Ben Dingel again expressed interest in drafting an RTAR to revisit fouling in enhanced chiller tubes. In addition to making another attempt to collect fouling data, this project would also look at how the fouling resistance is modeled/described for using in design and performance rating. TC 8.2 has also expressed interest in this topic. TC 3.6 might also be interested in cosponsoring such work.

*The topic of low GWP refrigerants has been on the table for a while now. There has been discussion of coordinating research activities between a wide range of TC's, including 1.3, 3.1, 8.2, 8.4, 8.5, 8.11, and 10.6. Omar Abdelaziz volunteered to take a shot at this, looking into the possibility of setting up a Multidisciplinary Task Group (MTG) around this. A forum for Chicago was proposed as a way to discuss this topic and identify research needs. If the forum did not get accepted and given a time slot during the conference program, it would be scheduled during our usual TC 1.3/8.5 research meeting time.*

*On the other hand, there was some consensus at the Montreal meeting to get something started that was more limited in scope to primarily TC 8.5 interest. In addition to the general topic of testing the heat transfer behavior of low GWP refrigerants, the behavior of zeotropic refrigerant blends in certain refrigerant-to-liquid heat exchangers was raised as a specific topic. Samuel Yana-Motta volunteered to begin drafting an RTAR in this area.*

*Omar raised the topic of investigating CO2 gas-coolers in domestic hot water heat pump systems.*

*The next RTAR submission deadlines are ~15-Aug (maybe 12-Aug/Fri?) and ~15-Dec. If an RTAR can get approved at the Oct RAC meeting, it might be possible to have a WS ready by 15-Dec.*

#### MISC NOTES

*Seventeen projects were sent out for bid in Spring 2011. There are 10-14 TRP's currently in the queue for bidding opportunities. However, the existing budget will allow only 2 of these to go out for bid this fall. Those in the queue will be prioritized at the Oct RAC meeting. It appears that there is little the TC's can do to affect the position of a TRP on the list.*

*DOE has launched three Energy Innovation Hubs that will help advance highly promising areas of energy science and engineering.1 The Greater Philadelphia Innovation Cluster (GPIC) has been selected to run the Energy-Efficient Buildings System Design Hub.2 GPIC is led by Penn State and is located at the Philadelphia Naval Yard. An objective is to promote energy efficient building systems, designs, and best practices with a focus on existing small commercial buildings. \$129M in funding is available over a 5 year period. ASHRAE leadership is reviewing a Memorandum of Understanding to allow participation in the Hub; looking for ways to meet GPIC's need for fast results with ASHRAE's technical rigor.*

*ASHRAE is developing an "Innovative Research Grant" with the objective to encourage and support high risk outside-the-box research that shows potential for significant advancement in technology. It is sort of a URP process, but doesn't go through the TC's. ASHRAE is projecting to fund up to one project per year at a level of \$50K/yr for two years with another \$25K in industry matching funds (\$125K total). The program is slated to ready by Fall 2012.*

*The new research liaison for Section 8 is David Yashar of NIST – this is a last minute change from Srinivas Garimella as listed in the recently distributed roster.*

**14. New Business**

No additional items.

**15. Schedule Next Meeting**

The next committee meeting will be held on Jan 24<sup>th</sup>, 2012 at 4:15 – 6:30 PM in Chicago, USA.

**16. Adjourn**

Following all discussions, the meeting was adjourned by majority vote [8-0-0] at 6:20 PM.