AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.
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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 1, 2008

TC/TG/TRG TITLE Liquid to Refrigerant Heat Exchangers

DATE OF MEETING Monday, January 21, 2008 LOCATION New York, NY

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
James Bryan	2006	Mahesh Valiya-Naduvath	2004	Scott MacBain
Axel Kreigsmann	2004	Art Fovargue	2005	Chad Ankeny
Samuel Yana-Motta	2005	Steve Eckels	2004	Jon Hartfield
Amir Jokar	2007			Dirk Graichen
Joe Huber	2007			Omar Abdelaziz
Ken Schultz	2007			Justin Kauffman
Kash Oza	2004	*Corresponding Members:*		M Sultan Khan
Harry Li	2007	Keith Starner	1999	Jonathan Olivier
		Michael Ohadi	2001	Behrooz Mohebbi
Corresponding Members:		Olivier Pelletier	2004	Ebrahim Alhajri
John Thome	2007	Saunders Smith	2006	Gary Zyhowski
Satheesh Kulankara	2003	William McQuade	2002	Massoud Neshan
Zahid Ayub	2005	Allison Andrews	2005	
Petur Thors	2005	Ty Newell	2005	
Ben Dingel	2007	Josua Meyer	2005	
Andreas Knoepfler	2007	Jamal Yagoobi	2007	
Dan Kihm	2007	Parviz Payvar	2007	
Jim Bogart	2007	John Judge	2004	

DISTRIBUTION

All Members of TC/TG/TRG plus the following:	
TAC SECTION HEAD:	**Vinod Gupta**
TAC CHAIR:	**Craig Wray**
ASHRAE MANAGER OF RESEARCH AND TECHNICAL SERVICES:	**Michael R. Vaughn, P.E.**
ALL COMMITTEE LIAISONS AS SHOWN ON TC/TG/TRG ROSTERS:	William Walter —Handbook Liason Michael Martin—Standards Liason Lynn Werman—Program Liason Ron Bailey —RAC Research Liason Michael Middleton—Chapter Technology Transfer Liaison
ADDITIONAL DISTRIBUTION	
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AMERICAN SOCIETY OF HEATING, REFRIGERATION, AND AIR-CONDITIONING ENGINEERS, INC.

Minutes
Technical Committee 8.5
Liquid-to-Refrigerant Heat Exchangers
January 21, 2008
2008 ASHRAE Winter Meeting, New York, NY, January 19-23, 2008

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

Chairman James Bryan called the meeting to order at 4:19 pm. The scope of TC 8.5 was read: "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. The following were present:

James Bryan (Chairman)	Dell
Ben Dingel	Trane 3600 Pammel Creek Road La Crosse, WI 54601
Amir Jokar	Washington State University WSUV, ENCS Vancouver, WA 98686
Ken Schultz	Trane 3600 Pammel Creek Rd La Crosse, WI 54601
Jim Bogart	GEA PHE Systems 100 GEA Drive York, PA 17406
Petur Thors	Wolverine Tube, Inc. 2100 Market St. NE Decatur, AL 35601
Zahid Ayub	Isotherm, Inc. 3305 Thorntree Ct. Arlington, TX 76001
Satheesh Kulankara	Johnson Controls 631 S. Richland Ave. 191A York, PA 17403
John Thome	Swiss Federal Institute of Technology (EPFL) Lausanne, Switzerland 1015

Joe Huber	Ketema LP 2300 W. Marshall Grand Prairie, TX 75051
Kash Oza	Standard Refrigeration Company 2050 N. Ruby Street Melrose Park, IL 60160
Harry Li	Carrier Corporation 9701 Old Statesville Rd Charlotte, NC 28269
Samuel Yana Motta	Honeywell 20 Peabody St. Buffalo, NY 14210
Axel Kriegsmann	Wieland-Werke AG Tannenwald Strasse 37 Donzdorf, Germany 73072
Dan Kihm	SWEP North America 3483 Satellite Blvd. Suite 210 Duluth, GA 30096
Andreas Knoepfler	Wieland-Werke AG Graf-Arco Str. 36 Ulm, Germany D-89079
Justin Kauffman	York/JCI 631 S. Richland Ave. York, PA 17406
Jon Hartfield	Trane 3600 Pammel Creek Road La Crosse, WI 54601
Chad Ankeny	GEA PHE Systems 100 GEA Dr. York, PA 17404
Olivier Pelletier	GEA PHE Systems Stuverigatan 5 Landskrona, Sweden 26135
Dirk Graichen	GEA WTT GmbH Remsaer Strasse 2a Nobitz, Germany 04603
M Sultan Khan	GIK Institute Pakistan
Jonathan Olivier	University of Pretoria
Behrooz Mohebbi	Pentair

Scott MacBain	Carrier P.O. Box 4808 Syracuse, NY 13221
Omar Abdelaziz	University of Maryland 3151 G.L. Martin College Park, MD 20742
Ebrahim Alhajri	University of Maryland 8136 Shadwell Park Falls Church, VA 22042
Gary Zyhowski	Honeywell 20 Peabody Street Buffalo, NY 14210
Massoud Neshan	1700 Rockridge CIR Huntsville, AL 35802

3. Establish Quorum Requirements

Voting members present were: James Bryan, Kash Oza, Axel Kriegsmann, Samuel Yana Motta, Amir Jokar, Ken Schultz, Joe Huber, and Harry Li. Members absent were: Steve Eckels, Art Fovargue, and Mahesh Valiya-Naduvath. With eight of eleven voting members present, the quorum was satisfied. As of this meeting, Chairman James Bryan has removed Jamal Yagoobi and Parvis Payvar as voting members due to non-attendance and has added Ken Schultz, Joe Huber and Harry Li as voting members.

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

4. Review/Approve Previous Meeting Minutes

Minutes from the previous meeting were circulated prior to the meeting. The committee voted unanimously [8-0-0] to approve the minutes as circulated. Meeting minutes will become official and re-circulated.

5. Chairman's Comments

James Bryan shared a number of comments from the Chairman's breakfast meeting.

February 8 is the Program submission deadline for the summer Salt Lake City meeting. ASHRAE is still suggesting they will require some form of publishing of seminar material, but to date it is still optional. The topic is controversial as many members (including TC8.5 membership) feel that this should not be an absolute requirement.

ASHRAE is promoting a Managing by Objective process for technical committee activities, encouraging the committee to have specific goals related to roster updates, activity forms, website updates, program activity, research activity and handbook activity.

6. Section Head Comments

Vin Gupta offered the following comments related to TC operation:

- TC members should work with the TC chairman to make sure the committee roster is up to date. Corresponding members should be purged from the committee if they are no longer active.

- Corresponding members should be active members of the TC and have some amount of tasks and activities in support of the TC. This helps to spread work over more people and helps new corresponding members get to know the committee and become more involved.
- Webmasters are encouraged to keep the TC website up to date.

When asked if the committee had any concerns, a number of members voiced disapproval of the policy that would require the release of seminar presentation materials (including audio). The primary concern being that the quality and timeliness of the presentations could suffer because of a potential presenter's desire to not "publish" sensitive or late-breaking material. Vin Gupta suggested this feedback was consistent with similar comments from other technical committees.

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

Ron Bailey, Section 8 Research Liaison, was present later in the meeting to comment on 1345-TRP. He stated that the PES was very well prepared for the task of awarding the project, and that AHRI involvement/co-funding of this project was much appreciated.

8. Handbook Subcommittee Report

TC8.5 is responsible for two chapters in the 2008 HVAC Systems and Equipment Handbook – Condensers and Liquid Coolers. Changes proposed by Harry Li and Joe Huber were circulated to the committee in the summer and subsequently incorporated to these chapters. No further comments this meeting.

9. Program Subcommittee Report

Subcommittee chair Amir Jokar reported that TC8.5 co-sponsored Seminar 15 "Falling Film Evaporation: Fundamentals and Applications" at this meeting. The session was well attended and well received.

Amir suggested that as a general goal, he would like to have a TC sponsored program set up for every meeting or at the least every other meeting.

Future program ideas were also discussed. A program suggestion with a topic of "Numerical modeling of two-phase flow and applications" was made, with an intended target meeting of the Chicago Winter (2009) meeting.

Another potential program topic, "Nanofluids for HVAC&R?" was suggested, as authors (Kedzerski, NIST) have expressed an interest to committee members in presenting material related to their research. Amir will target the summer Salt Lake City meeting for this program.

Amir stated that he would like another committee member to take over as Program Subcommittee chair following the Salt Lake City meeting.

10. Membership Subcommittee Report

Subcommittee chair Kash Oza reviewed the list of current members. With 2 recent member deletions due to inactivity, the current committee membership stands at 26. The committee voted unanimously [8-0-0] to accept the membership application of Tom Ortiz (HTRI). Two other potential corresponding members (Jun Wang from Trane and Dominique Kolandyan from ARI) were not approved as corresponding members as more information was required to determine the appropriateness of their membership inquiries.

Following the summer meeting, 5 members (Axel Kriegsmann, Mahesh Valiya-Naduvath, Kash Oza, Steve Eckels, and James Bryan) will be rolling off of voting member status. The following members expressed interest in rolling on as voting members: John Thome, Andreas Knoepfler, Dan Kihm, Satheesh Kulankara, Zahid Ayub, and Jim Bogart.

11. Standards Subcommittee Report

Current Standards Subcommittee chair Dan Kihm reported no significant change to ongoing standards activities. The two ongoing efforts include: Formation of a new SPC (Standards Project Committee) tasked to create an ASHRAE Standard (method of test) to accompany ARI Standard 470-2001, Desuperheater/Water Heaters and the progress of SPC 181, "Method of Testing for Liquid to Liquid Heat Exchangers". The standards liaison needs to have a roster for SPC 181 and will then assist in moving the standard forward.

12. Journal/Insights/Webmaster Subcommittee Report

Webmaster Joe Huber reported that he continues to update the committee website.

Please contact Joe with material to publish or with any website errors or omissions. The URL for TC 8.5's website is: http://www.tc85.ashraetcs.org/.

13. Research Subcommittee Report

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:

- Of the 2007-08 research budget of 2.4 million dollars, 1.2 million is obligated and 1.2 million is available for projects. Approximately $700,000 of the available money is committed to existing projects, and $480,000 available for new projects in the spring.
- The 2008-09 research budget is expected to be 2.3 million dollars.
- As of January 2008, there are 71 active research projects, up 3 from July 2007.
- By nearly all measures (work statements submitted, TRPs our for bid, new contracts, etc.) the 2007-08 year was more active than the 2006-07 year.
- A revised research manual was expected to be posted on the ASHRAE website by January 31, containing updated procedures and forms pertaining to research projects.
- The next Research Advisory Panel has been set up with the objective to update the Research Strategic Plan by 2010 (to be done every 5 years). Zahid Ayub is a member.
- Research topics emphasizing sustainability are specifically being encouraged.
- The USGBC has committed to providing $1 million to support "Green Building" research.
- As a testament to the potential speed at which projects can move with proper support and with quality work, there were 4 RTARs dated June of 2007 that went out for bid in the fall of 2007.
- Scheduling of rooms for PES (Proposal Evaluation Subcommittee) meetings is being encouraged to avoid holding these types of meetings in public places.

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

1316-RP – Experimental Evaluation of the Heat Transfer Impacts of Tube Pitch in a Highly Enhanced Surface Tube Bundle
Current Status: Active

At the research review meeting, Bruce Babin presented an update and overview of the progression of this research project. After some instrumentation changes and some iteration on measurement techniques, the single tube pool boiling rig was used to take data using R134a and a ¾" OD Turbo-BIIHP tube. Data was taken and reduced using both inlet/outlet water temperatures for average heat transfer coefficients per tube and using RTDs internal to the tubes to establish local heat transfer coefficients along the length of the tube. A Wilson Plot analysis was used to reduce the data. Results appear to agree reasonably well with previously published results for this tube, and values for average and local heat transfer coefficients are consistent. Future plans are to complete single tube data with R-123 and then start using the bundle facility. Preliminary data from the bundle facility could be available by the next meeting.

PMS members for this project are: Petur Thors (chair), Ben Dingel, Satheesh Kulankara, Axel Kriegsmann and Kash Oza.

1324-RFP – Study of Single-Phase Flow-Induced Tube Vibration in Shell and Tube Heat Exchangers
Current Status: No response to RFP

A reworded RFP went out for bid on 15-Oct-2006. No bids were received. In previous meetings, a motion was passed to re-submit the existing RP-1324 work statement after changing the award amount from $150,000 to $190,000, if sufficient interest by potential bidders was expressed. Although still possible, the committee concluded this action either needs to be taken soon or the project should be dropped by the committee.

1345-RFP – Waterside Fouling Performance of Brazed-Plate Type Condensers in Cooling Tower Applications
Current Status: Response to updated RFP received.

A second round of bidding for his project closed on December 15. Five bids were received, and all five were reviewed and scored by the PES. The PES members for this project are Ken Schultz, Jim Bogart, Axel Kriegsmann, Art Fovargue, and Xudong Wang (AHRI). The PES committee shared their evaluation of the proposals with the committee and made a unanimous recommendation. A motion to approve the unanimous recommendation of the PES and award the project consistent with their recommendation was made by Ken Schultz and seconded by Axel Kriegsmann. The motion was approved unanimously by the voting members [7-0-1]. Amir Jokar abstained from the bid discussion and voting due to a conflict of interest.

1394-WS – Study of Carbon Dioxide Condensation in a Chevron Angle Plate Geometry Exchanger
Current Status: Active

Work for this project is just beginning. The Principal Investigator is Amir Jokar at WSU-Vancouver. The PMS Chair for this project is Zahid Ayub and the other PMS members are Joe Huber and Jim Bogart.

Work has begun on a literature review but no existing carbon dioxide condensation in BPHE literature has been found. Identification and procurement of equipment and instrumentation for the test facility has begun. One difficulty that has been identified is finding a carbon dioxide pump to work with the low flow rates required for use with the planned 3 plate test BPHE. The size of the pump may dictate a need to increase the tested heat flux conditions or to add a bypass loop to the experimental facility. The PMS has recommended Dynalene as the single-phase test fluid for this study.

Fouling of Tube-in-Tube Type Condensers
This is the only remaining topic on TC 8.5's research agenda and is in need of an RTAR. HTRI has expressed interest in doing this project. ARI has indicated co-funding might also be available for this project.

Future Research Projects

In addition to the potential re-submission of TRP-1324 (Tube Vibration), one additional possibility for a new research project discussed within the committee was a second attempt at obtaining good data regarding the fouling performance of enhanced tubes.

Jon Hartfield (Trane) stated that he has submitted a draft RTAR to TC1.3 titled "Characterization of liquid refrigerant flow emerging from a flooded evaporator tube bundle" and he provided some details on the RTAR content. The proposed study would be aimed at understanding droplet size and the dynamics of liquid refrigerant leaving a flooded tube bundle. The study would be experimental in nature, and focus on characterization of liquid flow leaving a tube bundle using multiple refrigerant types, both with and without heat transfer. It was noted that a study of this type requires visualization and measurement techniques outside of most manufacturer's expertise, and is therefore ideally suited to an applied research type of project that is typical of ASHRAE research. Jon noted that an updated RTAR will be circulated following the meeting, and that co-sponsorship of this project from TC 8.5 would be appreciated. The committee expressed interest in supporting this effort and will vote on co-sponsorship at the appropriate time.

14. New Business

None – New issues were covered during the Chairman's comments or the appropriate subcommittee portion of the meeting.

15. Schedule Next Meeting

The next committee meeting will be held on June 23, 2008 at 4:15 PM in Salt Lake City, UT.

16. Adjourn

The meeting was adjourned by unanimous vote [8-0-0] at 6:30 pm.