AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.
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TC/TG/TRG MINUTES COVER SHEET

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TC/TG/TRG NO TC 8.5 DATE June 1, 2007

TC/TG/TRG TITLE Liquid to Refrigerant Heat Exchangers

DATE OF MEETING Monday, January 29, 2007 LOCATION Dallas, TX

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
James Bryan	2006	Parviz Payvar	2005	Ralph Breisch
Axel Kreigsmann	2004	Art Fovargue	2005	Yi Jia
Steve Eckels	2004	Jamal Yagoobi	2004	Jon Hartfield
Mahesh Valiya-Naduvath	2004			Robt. Morris
John Thome	2003			Brian Kastl
Ben Dingel	2003			Justin Kauffman
Kash Oza	2004	*Corresponding Members:*		Dominic Kolandayan
Samuel Yana-Motta	2005	Keith Starner	1999	Jenny Larsson
Corresponding Members:		Michael Ohadi	2001	Frederik Trumer
Ken Schultz	2003	Olivier Pelletier	2004	
Satheesh Kulankara	2003	Saunders Smith	2006	
Zahid Ayub	2005	William McQuade	2002	
Petur Thors	2005	Allison Andrews	2005	
Harry Li	2005	Ty Newell	2005	
Joe Huber	2003			
Amir Jokar	2005			
Josua Meyer	2005			
Jim Bogart	2006			
Andreas Knoepfler	2006			
Dan Kihm	2006			

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Minutes
Technical Committee 8.5
Liquid-to-Refrigerant Heat Exchangers
January 29, 2007
2007 ASHRAE Winter Meeting, Dallas, TX, January 27-31, 2007

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

New Chairman James Bryan called the meeting to order at 4:23 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)	University of Missouri Dept. of Mech. & Aero. Engineering Columbia, MO 65211
Jim Bogart	GEA - FlatPlate, Inc. 2161 Pennsylvania Ave York, PA 17404
Ben Dingel	Trane 3600 Pammel Creek Road La Crosse, WI 54601
Ken Schultz	Trane 3600 Pammel Creek Rd La Crosse, WI 54601
Steve Eckels	Kansas State University 64 Seaton Hall Manhattan, KS 66503
Zahid Ayub	Isotherm, Inc. 3305 Thorntree Ct. Arlington, TX 76001
Satheesh Kulankara	Johnson Controls 631 S. Richland Ave. 191A York, PA 17403
Petur Thors	Wolverine Tube, Inc. 2100 Market St. NE Decatur, AL 35601
Mahesh Valiya-Naduvath	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
Amir Jokar	Washington State University WSUV, ENCS Vancouver, WA 98686
Samuel Yana Motta	Honeywell 20 Peabody St. Buffalo, NY 14210
Kash Oza	Standard Refrigeration Company 2050 N. Ruby Street Melrose Park, IL 60160
Ralph Breisch	SWEP North America 3483 Satellite Blvd. Suite 210 Duluth, GA 30096
Harry Li	Carrier Corporation 9701 Old Stateville Rd Charlotte, NC
Axel Kriegsmann	Wieland-Werke AG Graf-Arco Str. 36 Ulm, Germany D-89079
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
Yi Jia	ClimateMaster 7300 SW 44th St. Oklahoma City, OK 73179
Jon Hartfield	Trane 3600 Pammel Creek Road La Crosse, WI 54601
Robt. Morris	Madok Mfg. 1452 Upper James St. Hamilton, ONT L9B1K3

Brian Kastl	AAON 2425 S. Yukon Ave. Tulsa, OK 74187
Dominic Kolandayan	ARI 4100 N. Fairfax Dr. #200 Arlington, VA 22203
Josua Meyer	University of Pretoria Pretoria, SA 0002
Jenny Larsson	SWEP International Landskrona, Sweden
Frederik Strumer	SWEP International Landskrona, Sweden

3. Establish Quorum Requirements

Voting members present were: James Bryan, Ben Dingel, Kash Oza, John Thome, Steve Eckels, Axel Kriegsmann, Mahesh Valiya-Naduvath, and Samual Yana Motta. Members absent were: Jamal Yagoobi, Parvis Payvar and Art Fovargue. With eight of eleven voting members present, the quorum was satisfied.

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.

All ASHRAE meetings are to have specific themes, and the upcoming Long Beach meeting theme is "Natural Ventilation".

Symposium sessions (presentation of papers published in ASHRAE Transactions) will now be called a Transaction Session, will be 1.5 hours long, and consist of 3 to 4(maximum) presentations.

The Long Beach meeting will have a new registration policy requiring session/symposium chairs to pay for meeting registration. Many members of the committee voiced concern and a lack of support for this policy. *A motion was made to officially object to session/symposium chairs having to pay for meeting registration. This motion was approved unanimously [8-0-0] and supported by all in attendance*.

James reported that TC activity is being tracked by monitoring the update of the committee roster, the activity feedback form, and the committee website. It is therefore important to keep these items up to date and submit as appropriate.

ASHRAE is emphasizing an embracement of paperless meetings, although it is unclear exactly what is suggested by this emphasis. Further detail will be provided to the committee as it becomes available.

In terms of research, James shared that many TCs are unsuccessful in getting RTARs approved even after revision and that there is a shortage of bidders on research projects. Approximately $800,000 is currently available to fund approved research projects.

Due to the departure of Louay Chamra from the committee, James reported that a new Vice Chairman is needed for TC8.5. After some discussion, a motion was made to nominate Amir Jokar as the new Vice Chairman of TC8.5. This motion was seconded and approved unanimously [8-0-0]. Amir graciously accepted the nomination.

6. Section Head Comments

None.

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

None.

8. Handbook Subcommittee Report

Chairman James Bryan announced that a new subcommittee chair to replace former committee member Louay Chamra was needed. Jim Bogart volunteered to accept this position. TC8.5 is responsible for two chapters in the HVAC Systems and Equipment Handbook – Chapter 35 Condensers and Chapter 37 Liquid Coolers. Joe Huber and Harry Li volunteered to share some comments and updates on these chapters. Depending on deadlines and review activity, email ballots may be required by the committee to approve any changes.

9. Program Subcommittee Report

Subcommittee chair Amir Jokar reported that there was no TC8.5 sponsored program for this meeting. Amir suggested sponsoring at least one seminar for the upcoming Long Beach meeting. Two possibilities were identified: “Two-phase Flow at Nano- and Micro-scale” and “Falling Film Evaporation”. Submission of each program will be made if a sufficient number of presenters can be identified. Deadline for Long Beach program submissions is February 9. Future program ideas were also discussed, targeting a Forum for the New York Winter meeting (one suggestion was to foster an open discussion concerning fouling in various heat exchanger technologies and their application considerations).

10. Membership Subcommittee Report

Subcommittee chair Kash Oza reviewed the list of current members. The 11 voting members for the current Society year (through end of June 2007) are: James Bryan, Ben Dingel, Kash Oza, Jamal Yagoobi, John Thome (Int’l), Steve Eckels, Art Fovargue, Axel Kriegsmann (Int’l), Parvis Payvar, Mahesh Valiya-Naduvath, and Samuel Yana Motta.

Following the June meeting, Ben Dingel and John Thome will be rolling off as members. Current corresponding members Ken Schultz and Harry Li expressed interest in becoming voting members for the next ASHRAE membership year.

11. Standards Subcommittee Report

Current Standards Subcommittee chair James Bryan submitted a request for replacement due to his new position as committee chairman. Dan Kihm volunteered to accept this position.

Joe Huber volunteered to serve as chairman of the SPC (Standards Project Committee) tasked to create an ASHRAE Standard (method of test) to accompany ARI Standard 470-2001, Desuperheater/Water Heaters. Zahid Ayub and Jim Bogart volunteered to serve on this committee.

James also reported that he is the chair of SPC 181, "Method of Testing for Liquid to Liquid Heat Exchangers", and the first SPC meeting will occur at this ASHRAE meeting.

12. Journal/Insights/Webmaster Subcommittee Report

Webmaster Joe Huber reported that he continues to update the committee website and that the committee has made use of the file sharing section. Please contact Joe 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:

- Zahid Ayub received the "Service to ASHRAE Research Award" for his long and dedicated participation on RAC. As a long-time member of TC8.5, the entire committee expressed their congratulations and gratitude to Zahid.
- President Terry Townsend's agenda is focused on: 1) sustainability. 2) obtaining baseline building performance data. 3) continuing on the path toward net zero energy buildings. These areas present significant opportunities for research.
- USGBC (US Green Building Council) is developing a research agenda. Look for a draft plan to come out this summer. Opportunities for collaborative research should exist.
- The California Energy Commission (CEC) is also developing an applied research agenda. Martha Brook heads the Buildings Program of the Public Interest Energy Research (PIER) Program in the governor's office. CEC has created a grant program to provide up to $50K of co-funding for ASHRAE research projects. PIER's focus is applied research that will have short-term impacts on California energy efficiency standards, utility energy efficiency incentive programs, or provide direct benefits to California consumers. PIER Buildings staff will work directly with RAC to identify appropriate projects and are willing to work with TC's to identify areas of mutual interest. Further information can be found at http://www.energy.ca.gov/contracts/pier_berg/solication.html.
- The Research Manual is being updated; a draft should be ready in June.
- Links to current RTAR and WS forms can be found on the ASHRAE Research webpage, http://www.ashrae.org/technology/page/39; the templates in the Research Manual are out-of-date.
- When RAC gives conditional approval to an RTAR or WS, the research liaison (RL) decides whether the changes made are significant enough to require a new TC vote or not.
- Repeat of policies – selection of contractor:
    - Expect lowest cost responsive bidder (score > 70) to be selected.
    - If wish to recommend an other, the following three criteria must be met:

        - 2/3rds of PES members must score the proposal higher than the lowest cost bid.
        - The score must be higher by more than 5 points.
        - The ratio of cost/score ($/pt) must be lower or score/cost (pt/$) must be higher.
    - PESs can request more information from bidders regarding proposals. Rescoring of proposals in light of new information is allowed.
- Repeat of policies – potential bidders authoring work statements:
    - Trying to balance conflicts of interest with having knowledgeable people as authors.
    - Potential bidder can be an author of a work statement as long as:
        - There are at least three authors to the work statement.
        - The author's bid must be within 10% of the work statement estimate.
        - The author must not have unique facilities or capabilities not identified in the work statement.
- When no bids are received for an RFP, MORTS follows up with those on the prospective bidders list that was supplied by the TC through the work statement cover sheet. (Do those comments get back to the TC and WS authors?)
- ASHRAE currently is flush with research funds and has a shortage of RTARs and WSs. The 06-07 research budget is $2.5M, the draft 07-08 budget is $2.2M. Projects have been averaging 20-25/yr @ ~$100K/ea. There are 99 TCs and TGs. RAC evaluated 21 RTARs at the Jun06 meeting: 13 (62%) were accepted, 7 (33%) were returned with questions and comments, and 1 (5%) was rejected. Of those returned, 60% were first submissions. So, emphasis on doing homework and following the guidelines outlined in the Research Manual was encouraged; make sure the research fits with ASHRAE's Research Strategic Plan. Work with your liaison all through the process.

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

<u>1205-RP – Water-side Fouling Inside Smooth and Augmented Copper Alloy Condenser Tubes in Cooling Tower Water Applications</u>
Current Status: PI terminated work (end date 31-May-06)

The PI submitted a final report to MORTS on 02-Nov-06. The PMS members (Art Fovargue, Keith Starner, Kash Oza, James Bryan, Bill Pearson, and Axel Kriegsmann) have reviewed the report. The following is their unanimous recommendation to the TC:

"No, the Final Report is not acceptable. The primary reasons for this are that no Phase III test results were included for the average & high fouling potential water chemistries, and because documentation for the time history of test operating conditions were never provided to the PMS as requested. This is not saying that there are not other deficiencies in the report. It is noted that this report does serve as a record of some of the accomplishments of RP1205. To have this on file is appreciated."

A motion was made for the committee to accept the recommendation of the PMS. The motion was seconded and passed unanimously [8-0-0]. The research chair will forward this on to MORTS. This closes this project from TC 8.5's perspective.

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

At the research review meeting, Bruce Babin presented an update and overview of the progression of this research project. Construction of the bundle test shell is well underway

and is expected to be complete by March. The shell for the single-tube pool boiling tests is also nearly complete. Supporting facilities are in place. Enhanced tubes (Wolverine Turbo BII HP and LP versions) have been received. Tube pitches selected for study are P/D ratios of 1.167, 1.33, and 1.5. A detailed analysis of the impact of water-side temperature measurement errors has been run. As a result, the contractor has chosen to use seven RTDs calibrated to ±0.025°C along the length of each instrumented tube in the four-pass test vessel. The contractor showed evidence of the ability to achieve this level of measurement certainty. This keeps the uncertainty in shell-side heat transfer coefficient due to water temperature measurement uncertainty to ~±4% (uncertainties in water flow rate and refrigerant temperature will increase this).

By the next meeting, a literature review and pool boiling tests with the first refrigerant should be complete. The primary graduate student working on this project has chosen to pursue a PhD with this research project as his primary research activity.

It was requested that the PI submit the presentation material to the PMS prior to the research review meetings in the future.

Louay Chamra was a member of the PMS for this project but he will be replaced by Axel Kriegsmann. The other PMS members are Petur Thors (Chair), Satheesh Kulankara and Ben Dingel.

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

This project went out for bid on 15-Oct-2006. No bids were received. Ben Dingel volunteered to follow up with several of those on the prospective bidders list to see why a bid was not submitted. MORTS should also be following up with those on the prospective bidders list. We will discuss direction for this project again in Long Beach.

1345-RFP – Waterside Fouling Performance of Brazed-Plate Type Condensers in Cooling Tower Applications
Current Status: No response to RFP

This project went out for bid on 15-Oct-2006. Similar to 1324-TRP, no bids were received. An inquiry of interest was received from HTRI after the submission deadline. Ken and Jim will follow up with HTRI on that interest and will discuss with the liaison (Ron Bailey) and MORTS what options are available for proceeding. ARI has offered to provide $47K in co-funding for this project.

1394-WS – Study of Carbon Dioxide Condensation in a Chevron Angle Plate Geometry Exchanger
Current Status: Work statement conditionally approved.

This work statement was conditionally accepted by RAC. Zahid addressed the questions and comments from RAC. The research liaison (Ron Bailey) has approved Zahid's response. This project will very likely go out for bid this spring.

Fouling of Tube-in-Tube Type Condensers
This topic was put on the long range research plan at a previous meeting (Orlando); see those minutes for background information. This is the only remaining topic on TC 8.5's

research priority list. HTRI has expressed interest in doing this project. ARI has indicated co-funding might also be available for this project.

1444-URP – Experimental Evaluation of Two-Phase Pressure Drops and Flow Patterns in U-Bends for R-134a, R-410A, and Ammonia
Current Status: Unsolicited Research Proposal submitted by John Thome, EPFL

TC 1.3 is taking the lead on review of this project. The TC 1.3 PES review was quite favorable, although several questions were raised. The TC 1.3 PES will follow up with the submitter to have those questions addressed. They will also suggest that the proposal be edited to explicitly identify how the proposal fits with ASHRAE's Research Strategic Plan. TC 1.3 expects this to proceed quite quickly and will conduct an email vote after the questions have been addressed. Once TC 1.3 has approved passing the URP on to RAC, TC 8.5 will conduct an electronic discussion and vote on whether or not to cosponsor the project. Target submission date to RAC is 15-May-07.

Future Research Projects

Prior to the meeting, Ken circulated a research idea related to secondary coolants. The objective would be to identify new secondary coolants being used, collect property information for the handbook, determine material compatibility issues, and verify performance predictions. Ken discussed this idea with the TC 3.1 (Refrigerants and Secondary Coolants) chair and research chair. TC 3.1 currently is working on an RTAR directed at evaluating secondary coolant systems as an alternative to direct expansion systems in supermarkets. Collection of secondary coolant information is implicitly included in this project. Given this, a specific project by TC 8.5 on this topic would be redundant.

No other new topic ideas were presented. Members are encouraged to continue thinking of topics that will enhance knowledge and spark new developments that benefit the ASHRAE community.

Based on recent experience, several strategies were discussed to improve the prospects of receiving responsive bids to RFPs. These include managing the scope of proposed work and estimating resources and costs more accurately. Identifying prospective bidders by direct contact early in the work statement process is allowed and encouraged. ASHRAE's policy of heavily favoring selection of the lowest cost "responsive" bid was said to be a discouragement for other qualified prospective bidders.

Thorough and careful evaluation of proposals/bids is encouraged. A PES can go back to bidders for more information if there are questions that need to be addressed. Proposals can be rescored based on this new information.

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 25, 2007 at 4:15 PM in Long Beach, CA.

16. Adjourn

The meeting was adjourned by unanimous vote [8-0-0] at 6:27 pm.