

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

Minutes

Technical Committee 8.5

Liquid-to-Refrigerant Heat Exchangers

June 21, 1999

ASHRAE Summer Meeting, Seattle, Washington, June 19-23, 1999

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

Chairman Mark Spatz called the meeting to order at 4:20 PM. Members and guests introduced themselves. The following were present:

Jim Larson	The Trane Company 3600 Pammel Creek Road La Crosse, WI 54601-7511
Keith Starner	Consultant 49 Westview Manor York PA 17404
Joe Huber	API Ketema 2300 W. Marshall Grand Prairie TX 75051
S. A. Sherif	Univ. of Florida Department of ME Box 116300 Gainesville FL 32611-6300
Satish Oza	Wieland Metals 1052 Harvard Lane Buffalo Grove IL 60089
Axel Kriegsman	Wieland-Werke AG Graf Arco Strasse Ulm Germany D-89070
Parviz Payvar	Northern Illinois University Dept. of Mech. Engr. Dekalb IL 60115
Shane Moeykens	The Trane Company 3600 Pammel Creek Road La Crosse, WI 54601-7511
Petur Thors	Wolverine Tube 2100 Market Street NE Decatur AL 35603
Mark Spatz	Allied Signal 20 Peabody Street Buffalo NY 14210

James Bryan	Outokumpu Copper 4720 Bowling Green Rd. Franklin KY 42134
John Thome	EPFL/LTCM LTCM-DGM Lausanne CH-1015 Switzerland
Steve Eckels	Kansas State University 346 Rathbone Hall Manhattan KS 66503
Kash Oza	Standard Refrigeration Co. 205 N. Ruby Street Melrose Park IL 60160
Zahid Ayub	ThermoFluid International 3305 Thorntree Court Arlington TX 76016
Ming Chyu	Texas Tech. Univ. Dept. of Mech. Engr. Lubbock TX 79409-1021
Jamal Seyed-Yagoobi	Texas A & M Univ. Dept. of Mech. Engr. College Station TX 77843
Neel Gupte	Carrier PO Box 4808 Carrier Parkway Syracuse NY 13221
Mike Ohadi	University of Maryland Dept. of Mech. Engr. College Park MD 20742
John Judge	York International PO Box 1592 York PA 17405
Karim Amrane	ARI 4301 N. Fairfax Drive #425 Arlington VA 22203
Louay Chamra	Mississippi State University PO Box ME Mississippi State MS 39762
Duane Randall	Kansas State University 346 Rathbone Hall Manhattan KS 66502

Riyaz Papar                      Lawrence Berkley National Lab  
1250 Maryland Avenue, SW #500  
Washington DC 20026

Josua Meyer                      Rand Afrikaans University  
PO Box 524  
Auckland Park 2006 South Africa

Majid Mollei                      University of Maryland

**2. Establish Quorum Requirement**

Voting members M. Spatz, J. Larson, K. Starner, N. Gupte, M. Ohadi, S. Oza, J. Huber, Z. Ayub, M. Chyu, K. Oza, P. Payvar, J. Seyed-Yagoobi, and P. Thors were present. N. Hanna was absent.

**3. Review/Approve Toronto Meeting Minutes**

A motion to approve the minutes of the Chicago meeting by P. Payvar, seconded by P. Thors, was unanimously approved.

**4. Chairman's Comments**

A new publication calendar for the year 2000 has been published.

- TEGA: The results of the member survey were published in the May 1999 Insights.
- Standards: TC 8.5 has standards 22 and 24 in process.
- Program: Packages for the Dallas meeting are due at ASHRAE headquarters August 6, 1999; for Minneapolis they are due January 24, 2000.
- Research: The procedure for Research Plans and Work Statements is changing this year. The new procedure uses an RTAR (2 pages max.) to describe the proposed research. The purpose is to secure ASHRAE agreement with the TC that the research is worthwhile. When an RTAR is approved, the TC must submit a Work Statement within one year.

TC 8.5 has final reports in the approved process for RP 751, 857, and 922.

- Handbook: ASHRAE wants to create a CD Rom version of the Handbook.

**5. Section Head's Comments**

Not present..

**6. Comments from Liaisons (Handbook, Standards, Journal, Research, Program, )**  
**7. Handbook Subcommittee Report**

B. Gustafson, Liaison for 2000 Handbook was present and asked about the progress on the cooler and condenser chapters. N. Gupte will furnish him the results of the recent FAX ballot on the cooler chapters. M. Ohadi will conduct a FAX vote on the condenser chapter revisions and forward the results by the end of July.

**8. Program Subcommittee Report**

M. Ohadi reported that a symposium, "Advances in Thermal and Fluid Aspects of Alternative Refrigerants/Refrigerant Mixtures", co-sponsored by TC 8.5, TC 8.4, and TC 1.3 was conducted on June 20. Plans for the Dallas meeting include symposiums "Advances in Thermal and Fluid Flow Characteristics of HVAC, Refrigeration and AC Process" and "Heat Exchanger Miniaturization", and a seminar "Visualization of Flow and Heat Transfer in Refrigeration and HVAC Process".

Plans for the Minneapolis meeting include symposiums "Advances in Thermal and Fluid Flow Characteristics of HVAC, Refrigeration, and AC Process" and "Use of Computational Fluid Dynamics in Heat Exchanger Design", and a seminar "MEM's for HVAC/Refrigeration Heat Exchanger and System Miniaturization".

Plans for the Atlanta meeting include symposiums "Advances in Thermal and Fluid Flow Characteristics of HVAC, Refrigeration and A/C Process" and "Use of Computational Fluid Dynamics in HVAC/Refrigeration Design" and a seminar "Flow Maldistribution Issues in Heat Exchangers".

**9. Membership Sub-Committee Report**

S. Oza reported that TC 8.5 has 19 members, 5 from Universities, 14 from industry. Josua Meyer from Rand Afrikaans University will now be a corresponding member and expects to attend all upcoming meetings. Corresponding member Ram Laks will probably not be able to attend future meetings, other than Dallas. Louay Chamra from Mississippi State University is applying for membership.

**10. Standards Sub-Committee Report**

The committee approved Standard 22 with minor changes at the Winter meeting. Several additional minor changes were made at ASHRAE headquarters. They may decide to send it out again for review.

Standard 24 went out for review during the past spring, 13 comments were received. S. Moeykens will do the Response to Commenter forms in the next 8 weeks. Work needs to be completed and at ASHRAE Headquarters by October 1, 1999.

**11. Journal/Insight Article Subcommittee**

J. Huber reported that the Journal is continuing to seek authors for articles. He also noted that ASHRAE has published a Web Site Policy for TC's. The TC chairman can post the committee minutes on the ASHRAE Web page.

J. Huber also reported that API Corporate has agreed to donate web space for a TC 8.5 web page. He can prepare the page.

**12. Research Sub-Committee Report**

K. Starner reported that following the meetings, S. Moeykens would take over as subcommittee chairman. RTAR's have been written for "Water-Side Fouling Inside Smooth and Augmented Copper Alloy Condenser Tubes in Cooling Tower Water Applications" and "Effect of Long-Term Electrohydrodynamic Cycling on Boiling Heat Transfer Condensation Heat Transfer, and Working Fluid Properties". A third, "Experimental Evaluation of the Heat Transfer Impacts of the Use of an Immiscible and Insoluble Lubricant/Refrigerant Pair" will be written by M. Spatz.

A motion by K. Starner, seconded by J. Huber to prioritize the RTAR's; 1) Water-Side Fouling Inside Smooth and Augmented Copper Alloy Condenser Tubes in Cooling Tower Water Applications, 2) Effect of Long-Term Electrohydrodynamic Cycling on Boiling Heat Transfer Condensation Heat Transfer, and Working Fluid Properties 3) Experimental Evaluation of the Heat Transfer Impacts of the Use of an Immiscible and Insoluble Lubricant/Refrigerant Pair; passed unanimously.

**13. 751-RP: Effect of Oil on Heat Transfer in Flooded Evaporators**

K. Starner reported that P. Payvar, the PI, had addressed the 5 questions from the PMS. A motion by K. Starner, seconded by Z. Ayub to approve the report with those 5 changes passed unanimously.

**14. 752-RP: Heat Transfer - Brazed Plate HX's**

P. Thors reported that he, P. Payvar, N. Gupte, and K. Starner met with the PI, W. Stewart on June 20, 1999. He continues to improve the test setup and the quality of the data. The equipment can now hold constant evaporator and condenser saturation temperatures except at 2-ton capacity. He is working to convert that. Prior data has been re-reduced and plotted. He will adjust subcooling and superheat to improve the consistency of the condenser data. He will provide pressure drop data for the next meeting. Heat exchangers from 2 manufacturers remain to be tested.

**15. 857-RP: EHD Enhancement in Evaporating Refrigerants**

J. Larson reported that a draft report was being reviewed. M. Ohadi still needed a copy and J. Judge would review the copy originally sent to K. Starner. The work appears complete except for the omission of some EHD power consumption data. The data was taken along with the published data. J. Seyed-Yagoobi will include it in the report. Review should be complete in about 8 weeks.

**16. 922-RP: EHD Enhancement in Condensing Refrigerants**

P. Thors reported that the draft report was submitted at the last meeting. The report is acceptable except for the omission of some EHD power consumption data. M. Ohadi, the PI, will supply an addendum for the in-tube condensation EDH power. PI. Payvar moved and P. Thors seconded a motion to accept the report, conditional on receiving the addendum mentioned. The motion passed, unanimously.

**17. 984-TRP: Effects of Inundation and Oil on Condensing R-134a**

J. Huber reported the project is planned for a single tube phase and a tube bundle phase. The single tube tests will be used to shake down the facility, and the data as a baseline for modeling. Some single tube data has been presented and it looks correct. Surface area calculation will be based on a value of 0.75" for the tube OD.

Tube bundle construction is complete and the inundation system will be installed next. Plans for the next few months include' complete single tube data, complete tube bundle construction, and finalize selection of oil with the PMS.

**18. 1089- RP: Flooded Evaporator: Using R-410A and R-507**

S. Moeykens reported that PMS includes N. Gupte, J. Huber, J. Judge, A. Kriegsman, P. Thors, and Art Fovargue. The literature search and initial modeling calculations are complete. The turbo BIII sample tubes have been received from Wolverine. Porous boiling tube from UOP is on order. The selected oil is a 68Cs POE oil.

**19. New Business**

M. Spatz expressed thanks of the TC to K. Starner for his services as Research Subcommittee Chairman.

**20. Schedule Next Meeting and Adjourn**

The next meeting will be in Dallas, 4:15 - 6:30 pm Monday, February 7, 2000. The meeting was adjourned at 5:50 pm.