

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

Minutes

Technical Committee 8.5

Liquid-to-Refrigerant Heat Exchangers

January 25, 1999

ASHRAE Annual Meeting, Chicago, Illinois, January 23-27, 1999

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

Chairman Mark Spatz called the meeting to order at 4:15 PM. The agenda was presented. 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 567 Northgate Parkway Wheeling, IL 60090
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
Elias Ragi	UOP 175 E. Park Drive Tonawanda, NY 14151
Brad Gustafson	Lawrence Berkley Lab 1000 Indep Avenue SW Washington DC 20585
John Thome	EPFL/LTCM LTCM-DGM Lausanne CH-1015
John Kelly	Kansas State University 302 Durland Hall Manhattan, KS 66506
Steve Eckels	Kansas State University 302 Durland Hall Manhattan, KS 66506
Kash Oza	Standard Refrigeration Co. 2050 N. Ruby Street Melrose Park, IL 60160
Zahid Ayub	ThermoFluid International 3305 Thorntree Court Arlington, TX 76016
Gren Yuill	University of Nebraska Room 123 E. Eng. 6001 Dodge Street Omaha, NE 68182-0176
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
Nabil Hanna	Koax 518 N. Indiana Street Oklahoma City, OK 73106

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
Bill Fox	Trane 3600 Pammel Creek Road La Crosse, WI 54601
Ben Dingel	Trane 3600 Pammel Creek Road La Crosse, WI 54601
Ajay Iyengar	Trane 3600 Pammel Creek Road La Crosse, WI 54601
Pradip Majumdar	Northern Illinois University Dept. of Mech. Engr. DeKalb, IL 60115
Karim Amrane	ARI 4301 N. Fairfax Drive #425 Arlington, VA 22203
Louay Chamra	Mississippi State University PO Box ME Mississippi State, MS 39762

**2. Establish Quorum Requirement**

All 14-voting members were present.

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

After a motion by J. Judge, seconded by M. Ohadi the minutes of the Toronto meeting were approved without addition or correction.

#### 4. **Chairman's Comments**

Chairman Spatz noted the following items from the chairman's breakfast meeting.

- The committee has no standard currently requiring revision
- There are several upcoming Journal articles which might be of particular interest to committee members; August - "Contemporary Refrigeration Issues", September - "Building Automation", November - "Centrifugal Chillers".
- The TEGA survey of ASHRAE members indicated members receive most information about ASHRAE from reading the Journal, less from reading Insights. Only a few read the Research Journal.
- A proposal is being considered that would revise the process for handling the committee Research Plan, Work Statements, and Project Approval. A copy of the proposal is attached to the minutes.
- This year more funds were available than were used on research projects. Committees are encouraged to write more work statements. Work Statements for the next approval cycle must be at ASHRAE headquarters by February 15.
- There is a renewed interest in unsolicited research proposals.
- TAC is initiating a new award for "exceptional service". There will be one annual award for all 90+ TC's. Nominations should come from the committees and will be submitted at the Seattle meeting.
- Programs (complete with reviewed papers) for Seattle are due February 12 at ASHRAE headquarters.
- The next handbook revision for the committee to address will be the 2000 Systems Handbook.
- There is now service space available to the committee on the Web. Eventually meeting agendas and minutes will be posted on the Web.
- K. Starner noted that notices of proposals are no longer being mailed to lists of prospective bidders. Prospective bidders are notified by email that there is information on proposed projects that they can obtain from the Web site.

#### 5. **Section Head's Comments**

Not present.

#### 6. **Comments from Liaisons (Handbook, Standards, Journal, Research, Program)**

Handbook: B. Gustafson inquired about the status of current handbook chapter revision. (See Handbook Subcommittee Report).

Standards: Not present.

Journal: Not Present.

Research: G. Yuill noted that the funding limit for research projects which do not need Board approval is being raised from \$100,000 to \$120,000.

Program: Not present.

Refrigeration: Not present.

**7. Handbook Subcommittee Report**

N. Gupte reported that reviewers will be: Condensers - M. Ohadi (Lead), K. Starner, Z. Ayub, N. Gupte. Liquid Coolers - N. Gupte (Lead), J. Larson, P. Thors, S. Dessiatoun, A. Fovargue. He will coordinate reviewer's comments and try to initiate a mail ballot by the committee. Revisions **must** be complete by the Seattle meeting. The goal is to be done before then, if possible.

**8. Program Subcommittee Report**

M. Ohadi reported that a symposium - "Advances in Thermal and Fluid Characteristics in HVAC and Refrigeration Processes" was co-sponsored by TC 1.3, TC 8.4, and TC 8.5 on January 24, 1999 in Chicago. The co-sponsorship seems to speed the process of recruiting presenters and reviewing papers. Future plans include: Seattle; Symposium - "Advance in Thermal and Fluid Characteristics in HVAC and Refrigeration Process" and Seminar - "Flow Visualization of HVAC and Refrigeration Process". Dallas; Tentatively one symposium, one seminar. Minneapolis; Tentatively one symposium, one seminar.

**9. Membership Sub-Committee Report**

S. Oza reported that James Bryan is a new member. He noted that other prospective members should apply and attend 2 meetings before the committee considers them for membership.

**10. Standards Sub-Committee Report**

S. Moeykens reported that the committee voted at the last meeting to reaffirm Standard 22 - "Method of Test for Condensers". He does not believe there has been any action by headquarters. The SPC for Standard 24 - "Methods of Test for Rating Liquid Coolers" submitted the revised version in February 1998. It was recently approved and will go out for public review in April.

M. Spatz noted that the committee for Standard 90.1 would need 12 replacement members. Details for applying for membership are attached to the minutes.

**11. Journal/Insight Article Subcommittee**

J. Huber reported that all articles for the '99 Journal are complete except the controls article for December. He noted the following articles might be of particular interest: March - "Elements of Ammonia Systems Design, May - "Screw Chillers", August - "Contemporary Refrigeration Issues", November - "Centrifugal Chillers". Members are still encouraged to submit articles although it may be longer than 3 months before they are published. The Journal won't accept work which has been published previously.

**12. Research Sub-Committee Report**

K. Starner reported that the '99 Research Plan was sent to headquarters following the Toronto meeting. It includes 3 projects and all still require Work Statements. The projects are:

1. Experimental Evaluation of the heat transfer impacts of the use of an immiscible and insoluble lubricant/refrigeration pair.
2. Waterside fouling inside smooth and augmented tubes in cooling tower water applications.
3. Effect of long-term electrohydrodynamic cycling on boiling and condensation heat transfer enhancement and working fluid properties.

M. Spatz volunteered to write a work statement for the first project. S. Moeykens and K. Starner will work together to initiate a work statement for the second.

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

K. Starner reported that data repeated since the Toronto meeting was presented and reviewed. A draft of the final report is being reviewed. P. Thors and N. Gupte have just now received copies to review. Comments from the PMS are being returned to P. Payvar, the investigator. He indicated the report would be revised within 3 weeks of his receipt of all comments. When the PMS is satisfied with the report they will send a letter to B. Seaton indicating the report has been approved by the PMS and recommended to the committee for approval. The TC can then vote by letter ballot.

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

P. Thors reported that in the last 6 month, improvements have been made to the experimental set up and data has been taken. Changes are necessary to correct a condition of high superheat entering the condenser. These changes will be made and data forwarded to the PMS by the end of February. Major objectives should be met in the near future.

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

Status: Project completed. Draft of final report sent to PMS.

Accomplishments:

- Measured electrical properties of R123, R134a, R407C, R404A.
- Pool boiling experiments, these four refrigerants, smooth and 19 FPI tubes
  - Included effect of oil } {R134a, 19 FPI
  - long term study } {2% oil
- Convective boiling experiments, R134a, and R404a
  - included effect of oil
- Also conducted fundamental studies of both pool boiling and conductive boiling.

The PMS will be J. Larson, M. Ohadi, P. Payvar and J. Judge. The PMS will read, report, and review it for completeness and accuracy. Collate comments by FAX or email. Will make recommendation to TC by FAX when review process complete.

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

P. Thors reported that the draft of the final report has been sent to the PMS. The last of the in-tube condensation data was reported on Sunday along with the shellside condensation data for two enhanced tubes with R134a and R404A. The PMS will begin reviewing the report.

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

J. Huber reported that since the Toronto meeting the PMS had requested changes to the test setup and those changes were complete. They include:

- Purchase and install 130 GPM pump to achieve 3°C bundle Delta T.
- Improved degassing system
- Verified uniform GPM/tube
- Repiped DX evaporator
- Will repeat Wilson plots and conduct distributor inundation uniformity tests with R-123.

J. Huber moved and Z. Ayub seconded a motion to grant a 12-month no cost extension. The motion was passed unanimously.

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

S. Moeykens reported that work has begun on the project. Plans include testing of 26 FPI and Turbo BII tubes. A porous coated tube from UOP will be included. The PMS is reviewing whether the tube pitch should be 7/8" or 15/16". Baseline testing will be with R134a rather than R22 as originally planned. Discussions by the committee confirmed that this is the best choice. The investigator has asked to use an "on-line" determination of oil concentration based on local temperatures. The PMS has approved this method, contingent upon confirmation of accuracy equivalent to "bomb" samples. The PMS includes S. Moeykens (chair), J. Judge, M. Chyu, and P. Thors.

**19. New Business**

The TC mandatory member list now includes a Webmaster - J. Huber volunteered for that position.

**20. Schedule Next Meeting and Adjourn**

The next meeting will be in Seattle, 4:15 - 6:30 PM, Monday June 21, 1999. Following a motion by Z. Ayub seconded by M. Spatz, the TC voted unanimously to adjourn at 6:15 PM.