



Worldwide Applied Systems Group
The Trane Company

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May 8, 2001

Membership of TC 8.5
Liquid-to-Refrigerant Heat Exchanger Committee

Ref: Minutes of the Atlanta Winter Meeting, January 29, 2001



Enclosed are the minutes of the referenced meeting along with the completed activity sheets. Please review these documents and make any comments or corrections to me at your earliest convenience. My phone number is (608) 787-3041 and my FAX number is (608) 787-2669.

Sincerely,

Jim Larson

Enclosure: Minutes of ASHRAE TC 8.5 Atlanta Meeting/ Activity Sheets

Cc: E. B. Gut, TAC Chairman
S. M. Westhoff, TAC Section Head
J. A. Driscoll, Special Publications Liaison
K. E. Ferguson, Journal/Insights Liaison
J. A. Pietsch, Standards Liaison
R. L. Shelton, Program Liaison
G. K. Yuill, RAC Research Liaison
W. E. Tinsley, TEGA Liaison
W. B. Seaton, Staff Liaison (Research)
C. B. Ramspeck, Staff Liaison (Standards)
M. J. Weiland, Staff Liaison (Tech Services)
A. Guerra, Refrigeration Liaison

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

Minutes
Technical Committee 8.5
Liquid-to-Refrigerant Heat Exchangers
January 29, 2001
ASHRAE Winter Meeting, Atlanta, GA, January 27-31, 2001

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

Chairman Joe Huber called the meeting to order. Members and guests introduced themselves. The following were present:

Ben Dingel	The Trane Company 3600 Pammel Creek Road La Crosse, WI 54601-7511
Neel Gupte	Carrier PO Box 4808 Carrier Parkway Syracuse NY 13221
Louay Chamra	Mississippi State University 210 Carpenter Eng. Bldg. Mississippi State MS 39762
Nabil Hanna	Koax Corp 518 N. Indiana Oklahoma City, OK 71306
Satish Oza	Wieland Metals 567 Northgate Parkway Wheeling, IL 90090
Ming Chyu	Texas Tech. Univ. Dept. of Mech. Engr. Lubbock TX 79409-1021
Zahid Ayub	Isotherm, Inc Arlington, TX
Darren Sheehan	Carrier Corporation PO Box 4808 Carrier Parkway Syracuse, NY 13221
Bill McQuade	York International PO Box 1592-191A York PA 17405-1592
Jim Bogart	Flat Plate, Inc 2161 Pennsylvania Ave York, PA 17404

Sateesh Kulankara	York International 631 S. Richland Ave – 191A York, PA 17403
Mahesh Valiya-Nadurath	York International PO Box 1592-191A York PA 17405-1592
Steve Eckels	Kansa State 346 Rathbone Hall Manhattan, KS 66506
Jurgen Voss	Outokumpu Grafenbergerallee 87 Dusseldorf, D 40237
John W. Coleman, PhD	Brazeway Inc 833 Valley Circle #103 Saline, MI 48176
Tim Shedd	UIUC 1206 W. Green St Urbana, IL 61801
Ty Newell	Univ. of Illinois 1206 W. Green St Urbana, IL 61801
Ralph Breisch	SWEP 1206 Lakewood Dr McKinney, TX 75070
Calvin Gallop	Carrier Mid Atlantic 3501 Progress Rd Norfolk, VA 23502
Stan Westhoff	The Trane Company 301 Old Niskayuna Rd Latham, NY 12110
Ken Schultz	The Trane Company 3600 Pammel Creek Road La Crosse, WI 54601
Samuel Yana	Honeywell, Inc 20 Peabody street Buffalo, NY 14210
Karine Brand	Wieland Werke AG Texas A&M University Dept. of Mechanical Engineering College Station TX 77843-3123

Axel Kriegsman	Wieland-Werke AG Graf Arco Strasse Ulm Germany D-89070
James Bryan	Outokumpu Copper 4720 Bowling Green Rd. Franklin KY 42134
Joe Huber	API Ketema 2300 W. Marshall Grand Prairie TX 75051
John Dunlap	Lanna, Dunlap, Spriggs 2112 W. Laburnum Ave Richmond, VA 23227
Petur Thors	Wolverine Tube, Inc 2100 Market Street NE Decatur AL 35601
Keith Starner	49 Westview Manor York, PA 17404
Art Fovargue	Dunham Bush 101 Burgess Road Harrisonburg VA 22801
Kash Oza	Standard Refrigeration Co 2050 N. Ruby St Melrose Park, IL 60160

2. Establish Quorum Requirement

Voting members Joe Huber, Nabil Hanna, Satish Oza, James Bryan, Art Fovargue, Kash Oza, Louay Chamra were present. Jim Larson, Michael Ohadi, John Judge, Parviz Payvar, Jamal Seyed-Yagoobi were absent.

3. Review/Approve Minneapolis Meeting Minutes

Minutes of the Minneapolis meeting were unanimously approved.

4. Chairman's Comments

- ASHRAE is creating a FAQ document to answer frequently asked questions. The TCs are being asked to address any questions pertinent to their committee. Joe reported that no questions appeared to be relevant to TC8.5.
- ASHRAE is interested in rejuvenating the research column in ASHRAE Insights. Members are asked to supply a 1000 word summary of a recently completed research project if interested.
- ASHRAE is interested in seeing TC members design short courses for upcoming meetings.
- Nominations for a Technical Achievement Award for service on a technical committee are being accepted. To this date, no awards have been given to anyone in group 8.
- Programs can now be submitted online through the ASHRAE website.
- It was noted that Seminars significantly outnumber symposiums this year. A suggestion was made that ASHRAE make seminar presentations available on the website to provide documentation for parties interested in using the material presented in the seminars.

- ASHRAE is in need of additional paper reviewers.
- ASHRAE is looking for potential speakers for the public sessions in upcoming meetings.
- ASHRAE will be enforcing the 12-figure limit on all technical papers.
- ASHRAE is asking for “keywords” from each committee for use on the website. A keyword suggestion sheet was passed among the voting members.
- Standard 22 has been approved, and is now designated 22-1992 (RA00)
- TCs are required to provide a canvas ballot committee that is used to evaluate standards. Volunteers willing to be additional members of the TC8.5 canvas ballot committee would be appreciated.
- Due to a change in how funds from the ARH Expo are being distributed, there has been a reduction in funding for ASHRAE research. ASHRAE will now be supporting only 110 research projects this year.
- The ASHRAE Journal is searching for authors on the topic “Controlling Moisture in Buildings”. It was noted that the Journal will continue to focus on articles geared to the practical side, while HVAC&R Research will focus on more technical research.
- ASHRAE STD 90.1 is looking for members. Interested parties can respond on the ASHRAE website
- The TC8.5 website has been online for 7 months. Joe would like to add as many past work statements as possible, and requests that any committee members with electronic copies of work statements please contact him.
- The scope of TC8.5 was read to the attendees. The scope is viewable on the TC8.5 website

5. **Section Head’s Comments**

Stan Westhoff, Section Head, stressed the importance of making sure the roster is current when the changeover in the database to occur.

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

No other liaisons present.

7. **Handbook Subcommittee Report**

N. Gupte reported that there were no outstanding items. 2000 Handbook Contains updated versions of chapters on Liquid Coolers and Condensers. ASHRAE is asking committees to be cognizant of the fact that ASHRAE is working on creating “interactive” content in its electronic version of handbooks. One possible implementation of this interactive idea would be to allow users to input values into a formula that would then return an answer.

8. **Program Subcommittee Report**

No report.

9. Membership Sub-Committee Report

S. Oza reported that there are currently 12 voting members, 8 from industry and 4 from universities. Due to the departure of Shane Moeykens, N.Gupte has taken over as research chair, and L. Chamra has taken over as Handbook chair. B. Dingel was approved as a corresponding member by a vote of 7-0-0. J. Larson will no longer be a voting member after the June meeting. Motion to approve P. Thors and Z. Ayub to voting members was approved unanimously.

10. Standards Sub-Committee Report

No report.

11. Journal/Insight/Webmaster Report

J. Huber covered these items as part of the Chairman's comments.

12. Research Sub-Committee Report

N. Gupte reported that there has been a reduction in the Research Budget. This will place more importance on the quality of the work statement if it is to be accepted. Two work statements have been received; "Experimental Evaluation of the Heat Transfer Impacts of Tube Pitch in a Highly Enhanced Surface Tube Bundle" and Experimental Evaluation of the Heat Transfer Impacts of the use of an Immiscible and Insoluble Lubricant/Refrigerant Pair". The work statement "Experimental Evaluation of Tube Vibration in Bundles with Single-phase Crossflow" has not been completed.

752-RP: Heat Transfer - Braze Plate HX's

The summary report promised by the end of last summer has not been received. Instead it was suggested that two papers which had been submitted to ASHRAE be used as the summary report, but this was not accepted. The last payment has been withheld and it is hoped that this will be resolved by the next meeting.

984-RP: R-134a/Oil Shellside Condensation

J. Huber reported that all pure refrigerant data was complete and the investigators are ready to begin taking oil data. Data for the 2D and 3D tubes was presented. When compared to the Beatty-Katz model for row effects, the agreement was good for low heat fluxes, but not as good at high heat fluxes. Further comparisons will be made to more complex models. Data for smooth tubes does not agree with the Nusselt-Kern model. Work will proceed to testing with oil. Up to 3 separators will be used to control oil concentrations. A motion by J. Huber (second by Z. Ayub) to grant a no cost extension was passed unanimously.

1089- RP: R-410A/R-507 Flooded Evaporator

P./ Thors reported that they are in the process of debugging the experimental system. The system consists of 20 40" long tubes on a 15/16" pitch, arranged 4-pass. A 2D and two 3D surfaces are in hand. The hi flux surface has not yet been received. The review of "State-of the-Art Boiling" and "Void Fraction/Flow Regime" literature is complete. A post-Doctoral researcher from Purdue is currently on the project. Plans are to do pure refrigerant tests of smooth tubes, then 3D tubes, then the plain finned tubes. Testing with oil concentrations will begin later this summer. A motion by P. Thors (second by A. Fovargue) to grant a one year no cost extension was passed unanimously.

1205-RP Bidder Approval

A. Fovargue reported that one proposal was received for "Waterside Fouling Inside Smooth and Augmented Copper-Alloy Condenser Tubes in Cooling Tower Water Applications". The proposal was from L. Chamra at Mississippi State. The Proposal Evaluation Subcommittee included K. Oza, K. Starner, J. Bryan, H. Roth and A. Meitz. In their evaluation they rated the proposal at 86% (70% is minimum). The PES was concerned with a lack of detail regarding the survey portion of the proposal. On a motion by A. Fovargue (second by Z. Ayub) the committee voted 6-0-1 to accept the proposal. The PMS will direct the investigator to provide additional detail .

13. New Business

- J. Huber would like to be notified of any papers that have been published as a result of TC8.5 sponsored research. He will put these references online at the TC8.5 website.
- As part of the ARI 21CR research initiative, there is a research project entitled "Variable Primary Flow Chilled Water Systems" which is in need of members serving on the PMS.
- All errors in roster should be corrected as a change in database will occur shortly.
- ASHRAE is requesting feedback from TCs on the relevance and use of results obtained in previous research projects. The following members were (will be) asked to write comments about the following projects:
 - RP392 - P. Thors
 - RP560 - A. Fovargue
 - RP676 - J. Huber
 - RP922 - P. Thors
 - RP751 - P. Payvar

14. Schedule Next Meeting

The next meeting will be 4:15 to 6:30 PM, Monday, June 25, 2001, in Cincinnati.

15. Adjourn

On a motion by L. Chamra (second by A. Fovargue) the meeting was adjourned.

ASHRAE TC/TG/TRG ACTIVITIES SHEET

DATE: May 7, 2001

TC/TG/TRG NO.: TC 8.5 TC/TG/TRG TITLE: Liquid-to-Refrigerant Heat Exchangers

CHAIRMAN: J. Huber VICE CHAIRMAN: _____ SECRETARY: J. Larson

TC/TG/TRG MEETING SCHEDULE				
Location-Past 12 Months	Date	Location-Planned Next 12 Months	Date	
Dallas	Feb 2000	Cincinnati	June 2001	
Minneapolis	June 2000	Atlantic City	Jan 2002	
Atlanta	Jan 2001	Honolulu	June 2002	
TC/TG/TRG SUBCOMMITTEES				
Function		Chairman		
Program		M. Ohadi		
Membership		S. Oza		
Research Monitoring		J. Huber, A. Fovargue, P. Thors		
Research Initiation		N. Gupte		
Handbook		L. Chamra		
Standards		N. Hanna		
Journal		J. Huber		
RESEARCH PROJECTS-CURRENT				
Project Title	Contractor	Monitoring Comm. Chpt.	Report Made At Meeting	
See Attached				
LONG RANGE RESEARCH PLAN				
Rank	Title	W/S Written	Apprv.	To R&T
1.	See Attached			
2.				
3.				
4.				

(OVER PLEASE)

RESEARCH PROJECTS - CURRENT

<u>Project Title</u>	<u>Contractor</u>	<u>Monitoring Committee Chairman</u>	<u>Report Made at Meeting</u>
RP-984: Effects of Inundation & Oil on Condensing R134a	Kansas State	J. Huber	Yes
RP-1089: Effect of Oil on Heat Transfer with HFC 410a & HFC 507	Swiss Federal Institute of Tech.	P. Thors	Yes
RP-1205: Waterside Fouling Inside Smooth and Augmented Condenser Tubes in Cooling Tower Water Applications	Mississippi State Univ.	A. Fovargue	No

LONG RANGE RESEARCH PLAN

<u>Rank</u>	<u>Title</u>	<u>W/S Written</u>	<u>Approved</u>	<u>To R & T</u>
1.	Experimental Evaluation of the Heat Transfer Impacts of Tube Pitch in a Highly Enhanced Surface Tube Bundle	Yes	No	
2.	Experimental evaluation of tube vibration in bundles with single-phase crossflow	No		
3.	Experimental Evaluation of the Heat Transfer Impacts of the Use of an Immiscible and Insoluble Lubricant/Refrigerant Pair	Yes	No	

HANDBOOK RESPONSIBILITIES					
Year & Volume	Chapter	Title	No.	Deadline	Handbook Subcom Liaison
2004 Systems	Chapter 37:	Liquid Coolers			
2004 Systems	Chapter 35:	Condensers			
STANDARDS ACTIVITIES-List and Describe Subjects					
Standard 22: No current activity Standard 24: No current activity					
TECHNICAL PAPERS from Sponsored Research-Title, when presented (past 3 yrs. present & planned)					
TC/TG Sponsored Symposia-Title, when presented (past 3 yrs. present & planned)					
See Attached					
TC/TG Sponsored Seminars-Title when present (past 3 yrs. present & planned)					
Flow Maldistribution in Heat Exchangers, Problems & Opportunities - San Francisco, 1998					
Emerging Technologies-Heat Exchanger Miniaturization - Toronto, 1998					
Flow Visualization of HVAC and Refrigeration Processes - Atlanta, 2001					
MEMS for HVAC/Refrigeration Heat Exchanger and System Miniaturization - Atlanta, 2001					
Flow Maldistribution Issues in Heat Exchangers - Cincinnati, 2001					
TC/TG Sponsored Forums-Title, when presented (past 3 yrs. present & planned)					
JOURNAL PUBLICATIONS, when published (past 3 yrs. present & planned)					

Submitted By: J. W. Larson

TC/TG SPONSORED SYMPOSIA - TITLE

**Thermal and Fluid Characteristics in HVAC and Refrigeration Heat Exchanger Processes
San Francisco, 1998**

**Thermal and Fluid Characteristics in HVAC and Refrigeration Heat Exchanger Processes
Toronto, 1998**

**Advances in Thermal and Fluid Characteristics in HVAC and Refrigeration Processes
Chicago, 1999**

**Advances in Thermal and Fluid Characteristics in HVAC and Refrigeration Processes
Seattle, 1999**

**Advances in Thermal and Fluid Flow Characteristics of HVAC, Refrigeration and AC Process
Dallas, 2000**

**Heat Exchanger Miniaturization
Dallas, 2000**

**Advances in Thermal and Fluid Flow Characteristics of HVAC, Refrigeration, and AC Process
Minneapolis, 2000**

**Use of Computational Fluid Dynamics in Heat Exchanger Design
Minneapolis, 2000**

**Advances in Thermal and Fluid Flow Characteristics of HVAC, Refrigeration and A/C Process
Atlanta, 2001**

**Use of Computational Fluid Dynamics in HVAC/Refrigeration Design
Atlanta, 2001**

**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.: T.C 8.5 DATE: May 7, 2001

TC/TG/TRG TITLE: Liquid-to-Refrigerant Heat Exchangers

DATE OF MEETING: Monday, January 29, 2001 LOCATION: Atlanta

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
J. Huber	'00	J. Larson (M)	'00	B. Dingel
N. Hanna	'99	M. Ohadi (M)	'98	D. Sheehan
S. Oza	'98	J. Judge (M)	'00	B. McQuade
J. Bryan	'00	P. Payvar (M)	'98	J. Bogart
A. Fovargue	'00	J. Seyed-Yagoobi(M)	'99	S. Kulankara
K. Oza	'99	M. Spatz (CM)	'00	M. Nadurath
L. Chamra	'00	J. Meyer (CM)	'00	S. Eckels
				J. Voss
Corresponding Members:				J. Coleman
N. Gupte	'00			T. Shedd
Z. Ayub	'00			T. Newell
M. Chyu	'00			R. Breisch
A. Kriegsmann	'00			C. Gallop
K. Starner	'99			S. Westhoff
P. Thors	'00			K. Schultz
				S. Yana
				K. Brand
				J. Dunlap

DISTRIBUTION:

ALL MEMBERS OF TC/TG/TRG

RESEARCH & TECHNICAL COMMITTEE CHAIRMEN: Edward B. Gut

TAC SECTION HEAD: Stanley Westhoff

LIAISONS:

Program: Ronald Shelton Journal: Kimball E. Ferguson

Handbook: _____

MANAGER OF TECHNICAL SERVICES: Martin Weiland

MANAGER OF RESEARCH: William W. Seaton

ADDITIONAL DISTRIBUTION: Standards: Claire Ramspeck - Manager

Standards: J. Pietsch, Liaison

Research: G. Yuill, Liaison

Refrigeration: A. Guerra, Liaison

TEGA: William E. Tinsley, Liaison

Special Publications: Joseph A. Driscoll, Liaison