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## **ASHRAE TC 8.5 Liquid – Refrigerant Heat Exchangers Annual Meeting, 25 January 2016 (Orlando, FL)**

*These draft minutes have not been approved and are not the official, approved record until approved by this committee.*

### **1. Call to order and reading of TC 8.5 scope (Ebrahim Al Hajri)**

TC 8.5 Chair, E. Al Hajri, called the meeting to order at 4:20pm. E. Al Hajri introduced the title, purpose and scope of TC 8.5. All attendees introduced themselves and signed on the roster sheet.

### **2. Establish quorum requirements (Y. Zou)**

10 of 13 (incl. non-quorum) voting members were present at quorum call; quorum was established.

Members present: E. Al-Hajri, S. Bendapudi, S. Eckels, S. Padhmanabhan, S. Perencevic, Z. Ayub, B. Dingel, E. Gorgy, A. Knoepfler, K. Oza

Members absent: J. Kauffman, J. Thome, J. Shaefer

### **3. Review/approve minutes from previous meeting (Y. Zou)**

Meeting minutes of TC 8.5 in ASHRAE Summer Conference in Atlanta was distributed and reviewed for approval. S. Padhmanabhan took the motion. E. Gorgy seconded. The minutes were passed with all in favor (10-0-0).

### **4. Section Head comments (Mr Dustin Meredith)**

TAC 8 Section Head D. Meredith attended this meeting. The TC members answered to D. Meredith that the quorum was established in this meeting. D. Meredith suggested to talk to the track head about the programs. It might increase the chances of TC 8.5 program being accepted.

### **5. Liaison Comments**

Research Liaison C. Wilkins attended the meeting. TC 8.5 had a RTAR that was approved in the summer 2014, RTAR-1731 Heat transfer performance of medium pressure alternative lower GWP refrigerant in a flooded evaporator composing an enhanced tube bundle. The work statement had not been submitted. The deadline to submit the work statement would be May 15<sup>th</sup> 2016. If extension was needed, TC 8.5 should notify C. Wilkins. TC 8.5 later discussed this issue as in the research subcommittee report of the minutes.

Standard Liaison J. Aswegan attended the meeting. It was time to make changes of Standard 24 – “Methods of Testing for Rating Liquid Coolers”. TC 8.5 should decide reaffirm, withdraw or modify the standard. TC 8.5 later discussed the issue as in the standard subcommittee report of the minutes. The decision should be sent to J. Aswegan by email.

### **6. Chairman’s report/comments (Ebrahim Al Hajri)**

E. Al Hajri summarized Chair breakfast report. E. Al Hajri summarized the situation of ASHRAE awards. 2015-2016 Hightower Award was given to Steve Duda, who was Head of Section 8. No nomination was submitted this year for Service to ASHRAE Research Award. TC 8.5 would like to nominate Ken Schultz for this award next year. The deadline would be Sep 1<sup>st</sup>, 2016.

Four new MTGs were formed in ASHRAE since Atlanta meeting.

- Avoided Source Energy Consumption Due to Waste Heat Recovery and Heat Pump Technologies



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- Impact of ASHRAE Standards and Technology on Energy Savings/Performance
- Indoor Swimming Pool Air Quality and Evaporation
- Occupant Behavior in Buildings

All TC websites had been updated. There was a new look. TC 8.5 website was updated and changed to the new look. E. Al Hajri encouraged everyone to check out the new website. The minutes and research topics were upload and updated.

CEC and TAC were looking for feedback on the technical program, particularly of your program submissions are frequently rejected and you are frustrated with the current process. Please contact Kelley Cramm ([TACcoord2@ashrae.net](mailto:TACcoord2@ashrae.net)) to submit the feedback before Jun 1<sup>st</sup>, 2016.

This winter meeting usually had more participants. E. Al Hajri suggested in the next meeting he would bring a microphone so we could have the web meeting for those who couldn't attend the meeting.

The summer meeting in St. Louis would be E. Al Hajri's last meeting as Chair of TC 8.5. S. Bendapudi would become Chair. Y. Zou would become Vice Chair. Satheesh Kulankara volunteered to be Secretary. The seminar, forums and workshop proposals for 2016 ASHRAE Annual Conference in St. Louis were due on Monday Feb 8<sup>th</sup> 2016. They should be submitted online. TC 2015-2016 calendar were available from Google. They could be uploaded to the mobile phone

RAC would be prioritizing for bid accepted research topics to reduce significantly the energy consumption for HVAC&R, water heating and lighting in existing homes. CEC always sought volunteers of session chairs and reviewers of session papers. Please provide the information to E. Al Hajri ([ealhajri@ashraeuae.org](mailto:ealhajri@ashraeuae.org)).

Please update the employment discipline to ASHRAE BIO online.

PDC sought ideas for new ASHRAE Learning Institute courses. Please contact Karen Murray ([kmurray@ashre.org](mailto:kmurray@ashre.org)) with new course ideas.

The upcoming ASHRAE Annular Conference would be in St. Louis. E. Al Hajri read the 8 tracks. There would be also other upcoming conferences. They were available on ASHRAE website.

E. Al Hajri shared the statistics of this conference in Orlando. Due to the high cost of booking rooms. ASHRAE would cut the programs. ASHRAE suggest TC to hold seminar in the TC meetings. Previous programs may be used in the TC business meetings. S. Kulankara mentioned it could be in the research subcommittee meeting. E. Al Hajri answered to B. Dingel that it would be published. Starting from 2016, ASHRAE would asked the source of research. Speaker would need to sign the disclosure of bias.

ASHRAE App could be used to evaluate seminars and speakers.

## **7. Membership subcommittee report (K. Oza)**

K. Oza summarized the membership activities. There were 13 voting members, 10 were here.

J. Kauffman would transfer out of US, so he wouldn't be able to attend the meeting in the next 2 years. He sent an email to TC 8.5 before this meeting to express his regards, he would like to re-engage once he came back to US. K. Nawaz had volunteered filled in J. Kauffman's role of Research Subcommittee Chair. He had started the job and attended the research subcommittee chair training. S. Eckels would filled in J. Kauffman's role as representative of TC 8.5 in the low GWP alternative refrigerants MTG.



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K. Oza, J. Schaefer and J. Kauffman would roll out, while K. Nawaz, J. Huber and S. Trimble would roll in after the meeting in St. Louis. There were currently 68 members in TC 8.5.

#### **8. Handbook subcommittee report (S. Padhmanabhan)**

S. Padhmanabhan summarized there was not much to report. The addition was turn in 2015 and it should be out in 2016. TC 8.5 had 4 year period to consider the changes.

#### **9. Program subcommittee report (S. Eckels)**

S. Eckels summarized the programs of TC 8.5. He didn't attend the meeting in Atlanta, GA. He wasn't aware any program was submitted. Last time, TC 8.5 submitted a seminar of low GWP refrigerant system in the enhanced tube. It was turned down. Feb 8<sup>th</sup> 2016 was the due date for the 2016 ASHRAE Annual Conference in St. Louis. There were plenty of potential tracks to put in seminars. TC 8.5 could resubmit the low GWP seminar to the summer conference in St. Louis or to the winter meeting in Las Vegas. A. Knoepfler would still like to give the presentation. S. Eckels would ask if Amir Jokar would like to give presentation. E. Al Hajri read the tracks of 2017 ASHRAE Winter Conference in Las Vegas. The potential tracks are Track 1: Fundamentals and Applications and Track 2: HVAC&R Systems and Equipment. The forums are discussion. The seminars are presentations. TC 8.5 thought the summer conference was more likely to get program.

S. Padhmanabhan suggested a program of advancement on plate heat exchangers and he volunteered to make presentations. Z. Ayub suggested to change title to be more general such as advancement on liquid-to-refrigerant heat exchangers, and mention low GWP in the title for better chances to get accepted. S. Eckels suggested if TC 8.5 approved. He would contact authors and bring the program to MTG to vote for co-sponsor.

For the paper session in the Winter Conference in Las Vegas, the conference paper abstracts would be due on Mar 16<sup>th</sup> 2017. If the authors submitted conference paper and mentioned TC 8.5 while Program Chair followed up these papers, the chances of being accepted would be higher. E. Al Hajri suggested enhanced tubes conference paper in general. L. Cremaschi suggested TC 1.3 could co-sponsor and have something to present. S. Eckels might have something also for conference papers of enhanced tubes in the Winter Conference in Las Vegas.

S. Eckels summarized the discussion and suggested TC 8.5 to submit the following programs.  
Seminar for the summer conference in St. Louis: low GWP refrigerant fundamental and heat exchanger  
Conference paper session for the winter conference in Las Vegas: enhanced tube  
TC 8.5 would vote this by email later.

#### **10. Standards subcommittee report (J. Huber)**

J. Huber reported the status of the relevant standards.

- Standard 22: "Methods of Testing for Rating Water-Cooled Refrigerant Condensers"
- Standard 181P: "Methods of Testing for Rating Liquid-to-Liquid Heat Exchangers"
- Standard 24 – "Methods of Testing for Rating Liquid Coolers"

Standard 24 needed actions. We could vote for withdraw, revise, or affirm. We needed to revise it to fully take care of the mandatory language and be consistent with other 2 standards. J. Huber suggested to vote to revise. J. Huber moved the motion. B. Dingel seconded. All in favor. It was approved. (10-0-0). J. Huber would filled out the forms and recommendation of committee chair. Joe will do that. Z. Ayub, S. Eckels, S.



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Kulankara, K. Nawaz, E. Gorgy would also be on the recommendation on the revision, so it balanced the producer, user, academia and general interest.

The other 2 standards were in good shape.

#### **11. Journal/Insights/Webmaster report (J. Huber)**

J. Huber reported that the website had been migrated to the new format. All previous contents were kept. The meeting contents and membership contents were transferred automatically. The research materials were tricky but were done. People might experience problems using the membership page, but Chrome and Firefox should be okay to open the membership page.

#### **12. MTG Liaison (J. Kauffman)**

J. Kauffman couldn't attend the meeting. S. Eckels would attend the MTG meeting on Wednesday Jan 27<sup>th</sup> 2017 and update in the next meeting

#### **13. Research subcommittee report (K. Nawaz)**

K. Nawaz attended the RAC meeting. RAC would be more interested in applied research. More on application than fundamentals. ASHRAE would be collaborating with AHRI on the research initiatives about low GWP refrigerant with mild flammability. In last year, 9 RTAR was considered and 5 was accepted. For the conditional accepted RTAR, TC would be supposed to provide feedbacks if co-sponsoring.

TC 8.5 had 2 active projects.

RP-1556 (co-sponsoring with TC 1.3): Characterization of Liquid Refrigerant Flow Emerging from a Flooded Evaporator Tube Bundle

W. Asher gave a presentation about this project. Bundle 1 testing nearly completed. R134a tests were done. R123 tests were under way, which would be completed by mid-February. Then, PI would switch to Bundle 2 after PMS reviewed and approved Bundle 1 data. Bundle 1 data would be published in the summer of 2016.

RP-1677: Measurement and Prediction of Waterside Fouling Performance of Internally Enhanced Condenser Tubes Used in Cooling Tower Applications

C. Shen presented the updates about this project. PI had finished the literature review and published the review paper. The experiment was set up. PI was developing fouling model. PMS met after the research meeting about system leakage, how cooling tower worked, and how to monitor and control the water quality. PMS suggested to monitor the water density.

B. Dingel added the following comments. For the last 2 years, PI put together the test facility. The system got bigger than the initial plan. Preliminary were reasonable. PI was ready to take the fouling data. There was concern about the water management. They have met with John Koen, who put them in touch with a company to provide pH meter to monitor the conductivity and monitor the water quality. PI would do trial run as the startup before the long term testing. PI was at the 2 year mark and asked for 2 year no cost extension. B. Dingel took the motion to extend up to and including February 2018. S. Padhmanabhan seconded. All approved (10-0-0). E. Gorgy asked how often PMS met. B. Dingel answered there was at least 1 conference call between the winter and summer meetings. L. Cremaschi suggested to start the test with high fouling to have data fast. PI could take L. Cremaschi work of water quality as the starting point.

There would be a new RTAR related to TC 8.5. It would be led by TC 1.3. The RTAR is Spray Evaporation on Enhanced Tube Bundles with Low GWP Pure Refrigerants and Refrigerant/Miscible Oil



Mixtures. J. Huber stated this RTAR was approved by TC 1.3 and sent to low GWP MTG for vote. The vote would be coming up the day after. S. Eckels would take the results back and if TC8.5 wanted MTG to co-sponsor. This RTAR was sent by email. The basis of this topic was more common in small chiller. MTG would appoint a representative in the writing of work statement and PMS. MTG co-sponsorship would be very useful. It would skip other TCs and go to MTG. TC 8.5 would not be co-sponsoring, but MTG would. TC 8.5 MTG representative would need to vote on the MTG co-sponsorship. J. Huber moved the motion to support representative to vote positive in the MTG. Z. Ayub seconded. All in favor. (10-0-0)

Research liaison said TC 8.5 had an accepted RTAR but no work statement was submitted: RTAR-1731 Heat transfer performance of medium pressure alternative lower GWP refrigerant in a flooded evaporator composing an enhanced tube bundle. J. Kauffman was working on the work statement. TC 8.5 would contact J. Kauffman for the RTAR and circulate within the members. There should be a work statement out there. J. Kauffman might have it. Some progress should be shown on the work statement before the summer meeting. Z. Ayub might have the work statement. He would search and circulate it for voting. Any comments in the RTAR and the work statement should be addressed. Research liaison would check the comments. Research subcommittee chair K. Nawaz would coordinate this. S. Eckels suggested to keep below the budget limit in the work statement.

At last, C. Shen comments about the extension of RP-1677. The project was very big. It needed 2 years of construction the test facility. He expressed his thankfulness to PMS and to L. Cremaschi for his work of RP-1345.

#### **14. New Business**

B. Dingel shared the response from ASME committee. TC 8.5 discussed the changes of ASME code in the previous meetings. The changes would eliminate some exceptions: 6 inch limit; use of water less than 300 psi. B. Dingel attended a number of meetings in ASME. ASME was unwilling to define a new limit so there would be no limit. ASME replied on others to define the limit. ASME had feedbacks from our committee and other places such as UL. The actual word were still being crafted, and then move to public review. B. Dingel suggested to get ASHRAE to provide some high level feedback. There probably were activities in both UL and ASHRAE to push for some wording changes of ASME code. During the discussion in TC 8.5, B. Dingel clarified that he didn't get any written response from ASME. The group was not familiar with refrigeration equipment.

#### **15. Schedule Next meeting: Monday June 27, St. Louis, 4:15 PM to 6:30 PM**

E. Al Hajri announced the time for next meeting.

#### **16. Adjourn**

E. Al Hajri moved the motion to adjourn. S. Padhmanabhan seconded. The meeting adjourned at 5:05pm with a unanimous vote (10-0-0).