

ASHRAE TC 5.5 Air-to-Air Energy Recovery
ASHRAE 2019 Annual Conference, Atlanta, Georgia
January 14-15, 2019

These minutes were APPROVED by voice vote of TC5.5 on 3/6/2019 5-0-0 CNV

Events	Time	Location*
Seminar 42: Using Air to Air Energy Recovery to Help Balance Comfort, IAQ and Energy	Monday, January 14, 2019 4:00pm – 5:00pm	Building B, 3 rd Floor Room B313b
TC 5.5 Handbook, Program, and Research Subcommittees	Monday, January 14, 2019 4:15pm – 6:30pm	Bldg B, 3 rd Floor Room B318
SPC 84 Method of Testing Air-to-Air Heat/Energy Exchangers	Tuesday, January 15, 2019 1:00pm – 3:30pm	Building B, 3 rd Floor Room B317
TC 5.5 Air-to-Air Energy Recovery	Tuesday, January 15, 2019 3:30pm – 6:00pm	Bldg B, 3 rd Floor Room B306

*** All meetings are held in the Georgia World Conference Center (GWCC)**

Agenda TC 5.5 Full Meeting

1. Call to Order / Welcome –
 - a. Call to order was made by chair at 1538
2. TC Scope

TC 5.5 is concerned with air-to-air heat exchangers, their application and cost benefit relationship. It includes consideration of the needs and procedures for standardization and testing, rating and terminology applicable to air-to-air energy recovery.
3. Introduction & Sign up (current email & updates)
 - a. A round of introduction was done.
4. Roll Call of Voting Members (exhibit 2)
 - a. Quorum was established with 9 voting members.
5. Agenda Review
 - a. Agenda was reviewed and approved.
6. Approval of Minutes
 - a. Annual Meeting (Houston) 2018-6-26 Meeting
 - i. MOTION 01: to Approve the minutes from the Houston meeting, by M. Afshin, 2n by J. Dieckman. Hand vote, motion passes (7-0-0-CNV)
7. Chair's Report (Matthew Friedlander)
 - a. See appendix A for chair's Report full summary
 - b. The point regarding the Fan-system interface / system curve point sparked some discussion. The assumption behind the weakness in the handbook are thought by members of the committee to be inaccurate.
 - i. John Bade volunteered to act as a liaison between TC-5.5 and a future WG to solve this perceived issue.

Subcommittee Reports

8. Handbook (G.D. Mathur)
 - a. See appendix B for Handbook's Report full summary.
 - b. The proposed new system sparked some discussion regarding the practicability of such a system and whether or not it belongs in the handbook.
 - c. The TC recommends the Handbook subcommittee to focus their energy on proven technology instead of hypothetical emerging applications.
9. Program (Ronnie Moffitt)
 - a. See appendix C for Program's Report full summary.
 - b. For Kansas City, Mo Afshin, Marc Tardif, Bertrand Poirier and Tom Rice volunteered to do a seminar on Frost Control and condensation mitigation. Kristin Sullivan volunteered to chair the Seminar.

- c. For Orlando, Adam Fecteau volunteered to do a presentation regarding Standard update. ASHRAE 90.1, 84, AHRI 1060 and maybe ISO could be addressed.
- 10. Research (John Dieckmann)
 - a. See appendix D for Research's Report full summary.
 - b. MOTION 2: To approve the WS-1799 as distributed previously, motion by J. Dieckman, 2nd by D. Erbe. Motion passes (9-0-0) Unanimous vote.
 - c. The potential project analyzing the impact of the casing/duct connection for energy performance testing. It was agreed that J. Dieckman will do some background research to present in Kansas City before any attempt for an RTAR is made.
 - d. It was proposed to put links on TC-5.5's website for resources on ERV modeling. It was agreed to wait for more background research before such action is taken.
- 11. Standards (Matthew Friedlander)
 - a. See appendix E for Standard's Report full summary.
 - b. SPC 84 voted for publication for public review of the standard during the Winter meeting with editorial edits to be done by Chair of SPC 84.
 - c. Members asked if the Fixed Bed Regenerator new method of test require a research project.
- 12. Website <http://tc0505.ashraetcs.org/> (James Scudamore)
 - a. See appendix F for Website's Report full summary.
- 13. Membership (Matthew Friedlander)
 - a. See appendix G for Membership's Report full summary.

Liaison Reports

- 14. ASHRAE Learning Institute (Paul Pieper)
 - a. See appendix H for ALI's Report full summary.
- 15. SSPC 90.1
 - a. SSPC 90.1 Activities – (Adam Fecteau)
 - i. See appendix I for SSPC 90.1's report full summary.
 - ii. A proposal by D. Erbe to organize a Webmeeting when Addendum CD – ERV by-pass damper to be organized in order for TC-5.5's member to review and understand its implication when it is out for public review.
 - iii. D. Erbe highlighted that SSPC 90.1 TPS was changed to now include building site and not just the building itself.
 - iv. D. Erbe advised that there will be a seminar co-sponsored by SSPC 90.1.
 - b. HVI/TC5.5 Working Group (Mo Afshin)
 - i. See appendix J for HVI/TC5.5's report full summary.
- 16. Standard 62.1 (Tom Rice)
 - a. See appendix K for SSPC 62.1's report full summary.
 - b. Regarding DA-98 and DA-99, process irregularities may have occurred and in the eventuality of publication for public review, TC5.5 is encourage to review and comment if necessary.
- 17. TAC Liaison's Report (Larry Smith)
 - a. Mr. Smith spoke to various issues.
 - i. He proposed work at the Section 5 level on the subject of characterization of the system curve, which he feels is incorrectly handled in the Handbook today. See Chair's Report ite 7.b.
 - ii. He reported to and discussed with the TC his understanding of TAC's proposal to reorganize the Sections into a smaller number of TC's encompassing larger technical interest areas.
 - b. See appendix L for TAC's Report full summary.

Old Business

New Business

18. MOTION 3: Motion to discuss TAC's proposal's response regarding which other TC should TC5.5 be combined with, by J. Dieckman, 2nd by K. Sullivan.
19. MOTION 4: Withdraw Motion 3 by J. Dieckman, 2nd by D. Erbe.
20. MOTION 5: Instruct TC5.5 chair to express the TC's dissatisfaction regarding the new reorganization to TAC and that TC5.5 do not wish to be combined with any other TC by D. Erby, 2nd by J. Dieckman. Motion pass 7-0-1 (J. Piscapo didn't vote).
21. MOTION 6: Motion by A. Fecteau to appoint Mo Afshin as TC5.5's liaison with SSPC 62.1, 2nd by J. Dieckman. Motion passes 8-0-0 (J. Piscapo was absent) unanimous vote.
22. MOTION 7: Motion by M. Afshin to keep A. Fecteau as TC5.5's liaison with SSPC 90.1 and becoming Vice-chair. Motion passes 8-0-0 (J. Piscapo was absent) unanimous vote.
23. MOTION 8: Motion by A. Fecteau to extend M. Friedlander chair term by 1 year, 2nd by J. Dieckman. Motion passes 6-0-1-CNV (J. Piscapo was absent).

Meeting was adjourned at 1807.

Next Meeting

Next face-to-face meetings will be at the Annual Conference in Kansas City, MO, June 22-26, 2019

- Matthew Friedlander, Chair TC 5.5
updated 2018-12-20

Exhibit 1:

ASHRAE Code Of Ethics

(Approved by ASHRAE Board of Directors January 30, 2013)

1.140.001.1 As members of ASHRAE or participants in ASHRAE committees, we pledge to act with honesty, fairness, courtesy, competence, integrity and respect for others in our conduct.

A. Efforts of the Society, its members, and its bodies shall be directed at all times to enhancing the public health, safety and welfare.

B. Members and organized bodies of the Society shall be good stewards of the world's resources including energy, natural, human and financial resources.

C. Our products and services shall be offered only in areas where our competence and expertise can satisfy the public need.

D. We shall act with care and competence in all activities, using and developing up-to-date knowledge and skills.

E. We shall avoid real or perceived conflicts of interest whenever possible, and disclose them to affected parties when they do exist.

F. The confidentiality of business affairs, proprietary information, intellectual property, procedures, and restricted Society discussions and materials shall be respected.

G. Each member is expected and encouraged to be committed to the code of ethics of his or her own professional or trade association in their nation and area of work.

H. Activities crossing national and cultural boundaries shall respect the ethical codes of the seat of the principal activity.

Exhibit 2: Voting Members and Officers as of 12/20/2018

Matthew Friedlander	Voting	Chair/standards Subc ch
Tom Rice	Non-voting	Vice Chair
Adam Fecteau	Non-voting	Secretary
Prakash Dhamshala	Voting	Subcommittee Chair
John Dieckmann	Voting	Research Subcommittee Chair
Ronnie Moffitt	Non-voting	Program Subcommittee Chair
James Scudamore	Voting	Webmaster
Paul Pieper	Non-voting	Ali Coordinator
Mohammad Afshin	Voting	Member
Marcus D'Arcy	Voting	Member
Drake Erbe	Voting	Member
James Piscopo	Voting	Member
Kristin Sullivan	Voting	Member

Appendix A: Chair's Report Summary

- President's Theme 2019:
"Building our new energy future"
 - If you are a buildings professional, it is highly likely you will experience significant changes in your professional practice during your career. That's because a rapid evolution is underway in the electricity sector that will also have a significant impact on the buildings sector. The result of this evolution is our new energy future. That new future is not far away. As a critical organization for buildings professionals, ASHRAE and its members must take an active role in the ongoing changes that will create this new energy future.
 - www.ashrae.org/File%20Library/About/Leadership/new_energy_future_web_061518.pdf
- Fan-system interface / System Curve
 - Perceived weakness in Handbooks with respect to determination of shape of system curves.
 - Paper by Craig Wray proposes methods to characterize.
 - Chair will circulate to TC5.5 members and ask for volunteer to act as a liaison.
- To be presented by TAC Liaison Larry Smith
 - Reorganization of existing TCs into Technical Working Groups – closer to MTG multi-disciplinary format
 - Challenge 2020

Appendix B: Handbook's Report summary

- New section 8 "Control strategies or Air-to-Air Heat Exchangers"
 - As written this section only talks about frost control. Contributed by Paul Pieper. References are needed.
 - We also need to add strategies for controlling performance, humidity, etc.
- New section added after heat wheel on humidification using heat wheels during winters. Contributed by Mike Scofield.
- Added a section on unit ratings by the Home Ventilating Institute.
- Added 12 new references on heat pipes, thermosiphons and heat wheel.
- Add a methodology to estimate the performance of the desiccant wheel, followed by an example problem.
- Modify Figure 16 to use heat from a solar source. This will show how an advanced desiccant wheel system augmented by a solar panel is environmentally friendly and responds to the new United Nation's Climate Change warning declared two month ago.
- Show a system with desiccant and heat wheels using waste heat or solar energy.
- Who:
 - Paul complete controls
 - Prakash additional content
 - GD final editing
- By When: Draft chapter to TC by May 1

		2016			2017			2018			2019			2020		
		Apr	Jul	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct
Review	Current HB received (June 1)	June 1														
	TC selects HB subcom and chair				Feb 1											
	Review current HB for changes				Jul 1											
Revise	Decide extent of and outline revisions				Jul 1											
	Seek and appoint reviser(s)							Feb 1								
	Revise chapter(s)										Feb 1					
Approve	Send revised chapter to TC for review															
	TC approves chapter													Jul 31		
	Send chapter to HBC liaison													Jul 31		
Edit & Produce	HQ sends chpt. proof to TC contact															
	HB sent to printer (April 1)													Mar 15		
	HB mailed (May 15)													Apr 1		

HBC = Society Handbook Committee

HB = Handbook volume

HQ = ASHRAE Headquarters editorial staff

Appendix C: Program's Report summary

Deadlines for Kansas City 2019

- February 8'19 Seminar, workshop, forum, debate and panel proposals
(Identify chair, speakers and abstracts including learning objectives)

► **Kansas City 2019**

1. Systems & Equipment in the Built Environment
2. Fundamentals and Applications
3. Optimization in HVAC&R

► **Frost and condensation mitigation**

1. Commissioning New & Existing Buildings
2. Occupant Health & Safety
3. Modeling Throughout the Building Life Cycle
4. Professional Development
5. Research Summit
6. Radiant Heating and Cooling Mini-track

Deadlines for Orlando 2020

- March 18 '19 Conference paper abstracts, Paper Session requests
- August 2 '19 Seminar, workshop, forum, debate and panel proposals
(Identify chair, speakers and abstracts including learning objectives)

► **Orlando 2020 Tracks**

1. HVAC&R Fundamentals and Applications
2. Systems & Equipment
3. Refrigeration and Refrigerants
4. Cutting Edge Approaches
5. High Efficiency Design and Operation
6. Big Data and Smart Controls
7. Ventilation, IAQ and Air Distribution Systems

► **AAERV Use in health care environment**

1. Standards, Guidelines and Codes

► **Latest Test Standards**

Appendix D: Research's Report summary

- **RTAR1799 *Validation of scaling test results of small energy recovery exchangers to geometrically similar, but larger exchangers.***
 - Has been provisionally approved by RAC. The Air-conditioning, Heating and Refrigeration Technology Institute (AHRTI) has agreed to co-fund the project.
 - Work Statement WS1799 "Validation of Extrapolation of Performance Rating Test Results for Small Energy Exchangers to Large Exchangers" has been through several iterations of review and revisions with our Section 5 Research Liaison (RL), Dennis Loveday, who endorses the WS.
ACTION: TC5.5 to vote to approve the WS.
 - The deadline for WS submissions for consideration at that meeting is March 15th.
- ***Improved energy recovery exchanger submodels:***
 - Rather than developing a Research proposal, it was agreed in Houston that TC5.5 should consider developing a white paper on the subject.
Ad hoc work group: Dieckmann, Sullivan, Tardif, D'Arcy.
 - Kristin Sullivan has reviewed the most recent Energy Plus documentation for its built-in submodel for "Air System Air-To-Air Sensible and Latent Effectiveness Heat Exchanger". Perhaps oversimplifying, the model seems to have the inputs necessary to characterize effectiveness, some control functions and functions like defrost. However it is not clear that pressure drop (and therefore parasitic power losses) are captured.
 - Kristin and Marc Tardiff intend to run some simulations to see if the results make sense. Further review of the Energy Plus submodel is in order, along with a review of some of the modeling that has been done to support ERV evaluation for 90.1.

Appendix E: Standard's Report summary

- TC 5.5 is responsible for Standard 84 *Method of Testing Air-to-Air Heat/Energy Exchangers*. The 2013 version is now under revision.
- Basic scope of work: (a) edit the standard into mandatory standards language; (b) add a method of test for fixed-bed regenerators.
- First meeting in St. Louis, summer 2016. (28) meetings to date.
- Did not meet the targeted completion date of end of 2018. Now targeting completion by Kansas City.
- Voting Members: John Bolster, TJ Farrell, Matthew Friedlander, Andy Kebernik, Richie Mohan, Ronnie Moffitt, Mary Opalka, James Scudamore, Carey Simonson, Chris Stone
- Non-voting members: Wongyu Choi, Adam Fecteau, Marc Tardif
- SPLS Liaison: Adrienne Thomle Staff Liaison: Mark Weber

Appendix F: Website's Report summary

- At the last TC meeting it was suggested that contact information be added to the website for the chairs and subcommittee chairs. This information has been added using the alias email addresses provided by ASHRAE, under the "additional information" section of the homepage. The website remains up to date with information pertaining to the Atlanta meetings.
- <http://tc0505.ashraetcs.org/>

Additional Information

Key Committee Contacts:

Chair	Matthew Friedlander	tc0505@ashrae.net
Vice Chair	Tom Rice	tc0505.VCH@ashrae.net
Secretary	Adam Fecteau	tc0505.SEC@ashrae.net
Handbook Subcommittee Chair	G.D. Mathur	tc0505.HBK@ashrae.net
Program Subcommittee Chair	Ronnie Moffitt	tc0505.PRO@ashrae.net
Research Subcommittee Chair	John Dieckmann	tc0505.RES@ashrae.net
Standards Subcommittee Chair	Matthew Friedlander	tc0505.STD@ashrae.net
Webmaster Subcommittee Chair	James Scudamore	tc0505.WEB@ashrae.net

Appendix G: Membership's Report summary

- Chair has removed a number of members whose email addresses were non-responsive from the Roster.
- 2019-01-11 Roster:
 - (104) Members
 - (18) of these are Provisional Corresponding Members and will be accepted as Corresponding
 - (9) are Voting Members -- one rolls off after Kansas City
 - Chair proposes to add Carey Simonson and John Bade as voting members.

Appendix H: ALI's Report summary

- The courses continue to be offered approximately twice per year.
- In 2018, courses were presented during the Winter meeting and again during the Spring Online series, to good attendance.
- In 2019, the "Air-to-Air Energy Recovery: Best Practices" was presented at Winter Meeting(Sunday, January 13th) and will be offered with the Spring online courses being offered by ALI (Tuesday, March 19th).
- The AAERV: Best Practices is the most popular presentation and was revised and updated in 2018.
- In contrast, the "ERV Fundamentals" is only presented about 1 of 10 times, but I find that many attendees of "Best Practices" don't actually know as much as they should.
- Therefore, I will update the Fundamentals course so that approximately 1/3 of the allocated time would be devoted to AAERV controls. With proper verbiage in the Agenda and Objectives, I think adding the Controls portion will renew interest in this course. I plan to include information on alternating-mass HXers as well.
- I expect to submit the revised course to ALI before the summer meeting; but am not sure what the turn-around time will be.

Appendix I: SSPC 90.1's report summary

- SSPC focused on resolving addendum to prepare for publication of the 2019 edition of 90.1. Since Houston there have been no new addendum relating to ERV.
- Addendum DN – Brings clarification to exception 3 and 7 to Table 6.5.6.1 (requirements for ERV). Minutes of Houston meeting provide more details. It will be incorporated into the 2019 edition of 90.1.
- Addendum AY – Requires ERV in multi-unit residential buildings over three stories in many climates. Was voted for publication with objectors, 29-5-8, subject to continuation ballot.
- Addendum AO – Replace Fan Efficiency Grade (FEG) with Fan Energy Index (FEI). It is now a Wire to Air efficiency metric and is dependant on the point of operation, not the fan alone. Was voted for publication with objectors, 38-0-1, subjected to continuation letter ballot. Will impact manufacturers and possibly specifiers.
- ERV By-Pass Working Group – WG has been negotiating a ~~not yet named~~ addendum CD requiring by-pass damper for Economizer and Pressure relief for ERVs. Now has an exception for 100% outdoor air unit less than 10,000 cfm. Passed ~~Mechanical Sub-Committee~~, next moves to the SSPC and should go out for public review in March of 2019. Will not be part of the 2019 edition of 90.1.

Note : ~~Strikes~~ and Underlines are edits and corrections from what was presented at TC5.5.

Appendix J: HVI/TC5.5's report summary

- What happened in 2018:
 - As reported by Adam Fecteau efforts by the HVI/TC5.5 Working Group resulting in addendum ay, which was approved (subject to continuing letter ballot) for publication in 2019 edition of 90.1
- The next step is preparation of the User's Manual for the 2019 90.1.
 - At the SSPC 90.1 fall meeting, Gus Faris volunteered to start a working group to create the UM.
 - TC5.5 has requested Mo Afshin be included in the working group.
 - It does not appear that working group has been formed.
 - At some point a contractor is hired to review the entire and current User's Manual and redline to indicate places in which changes are needed in response to the new content in the standard. The contractor may propose specific edits.
 - Workgroups are set up within the MSC for each addenda to monitor that work. It is possible those workgroups could generate content before the contractor starts their work.

Appendix K: SSPC 62.1's report summary

- DA-82 ab – discussing improvements on Normative Appendix for CO2 concentration calculations within a space to improve use of demand control ventilation
- DA-90 – Humidity limits (summer) – new limit of 60 degree dewpoint max in unoccupied/night setback
- DA-91 updating informative appendix C for IAQP
- DA-97 regarding Ozone producing devices – creating a limit for acceptable levels of ozone
- DA-98 – Eliminate the exception on Class 3 air with regards to recirculation
- DA-105 regarding CO2 accuracy to further support DCV
- None of these items are fully approved as there is a letter ballot that will be issued. The DA-90 will go out again with small modifications for public review. DA-98 will be a key item to focus on for TC 5.5 because of direct impact to Air to Air.
- Additionally, there is DA-99 which was not discussed further and tabled until Kansas city which would reduce the Air to Air exception allowable recirculation to 5% in lieu of 10%.

Appendix L: TAC's Report summary

- Herman & Dorothy Behl's Endowment Fund (<http://foundation.ashrae.biz/.....DONATE>)
- Reorganization of existing TCs into Technical Working Groups – closer to MTG multi-disciplinary format
 - 75-150 active members per TWG
 - Increase TWG effectiveness through collaboration
 - Encourage work outside of the summer/winter conferences
 - Reduce meeting space footprint
- Challenge 2020
- What is important for the Chair and the current vice chair?
 - Leadership
 - Leadership succession - Get On The Ladder (GOTL)
 - Membership Roster
 - Conduct the meetings

Questions