

ASHRAE Technical Committee (TC) 5.5 Air-to-Air Energy Recovery
ASHRAE 2020 Winter Conference, Orlando FL
February 4, 2020, 3:30 to 6:30 pm Eastern Time

DRAFT MINUTES

These are draft minutes and are not considered final until approved by vote of TC5.5

1. Call to Order / Welcome
Called to order 3:34 by chair Matthew Friedlander
2. Introductions/ Attendees (guests sign in sheet is attached to these minutes – Exhibit 2)

Matthew Friedlander	Present	Voting (6/30/2020)	Chair (6/30/2020) Standards Subcommittee Chair
Adam Fecteau	Present	Voting (6/30/2023)	Vice Chair (6/30/2020) 90.1 Liaison
Mo Afshin	Present	Voting (6/30/2022)	Secretary (6/30/2020) 62.1 Liaison
Prakash Dhamshala	Present	Voting (6/30/2022)	Subcommittee Chair
John Dieckmann	Present	Voting (6/30/2022)	Research Subcommittee Chair
Ronnie Moffitt	Present	Non-voting	Program Subcommittee Chair
Paul Pieper	Absent	Non-voting	Ali Coordinator
Marcus D'Arcy	Present	Voting (6/30/2020)	Member
Drake Erbe	Present	Voting (6/30/2021)	Member
James Piscopo	Absent	Voting (6/30/2020)	Member
Kristin Sullivan	Present	Voting (6/30/2022)	Member
John Bade	Present	Voting (6/30/2023)	Member
Carey Simonson	Present	Voting (6/30/2023)	Member
Marc Tardif	Present	Voting (6/30/2023)	Member
Brandon Damas	Absent	Non-voting	Webmaster

3. Roll Call of Voting Members
11 voting members are present. Quorum is established.
4. Agenda Review and Adoption
Adopted unanimously by TC
5. Approval of Minutes
 - a. Annual Meeting, Kansas City, June 25, 2019
 - b. Strategy Planning Webmeeting December 6, 2019
 - c. Sub-committee Chair and Liaison Meeting December 12, 2019

Approval of the 3 minutes above was moved by Mo Afshin, seconded by John Bade.

MOTION CARRIED with (10) yes, (0) no, Chair Not Voting

Chair's Report

The Technical Activities Council (TAC) has over the past few meetings been working to increase its activism and help implement the organizational streamlining element of the ASHRAE Strategic Plan. One element of that work has been to look for TCs that should be merged into others. But underlying that is TAC's intention to, as is its charter, annually determine whether each TC should be continued, or should instead be merged or dissolved. This TC has made clear that we don't have an interest in merging with another Section 5 TC, and Section 5 Head, Larry Smith, understands our reasons. And we are active, relevant TC and as such at no risk of being dissolved. Having said that we can expect to justify our existence on a regular basis in the future, and I think this is a good thing and an opportunity to regularly evaluate our relevance, our plans, and our progress on our plans.

ASHRAE's Chapter Technology Transfer Committee sponsors the "ASHRAE Tech Hour" which is a video presentation on some topic which is accessible via ASHRAE 365 and also reside on YouTube. They appear to be interested in hearing about suggestions for more presentations. So far they have at least two: Occupant Health, Building Energy Performance and Humidity presented by Stephanie Taylor, M.D., M. Arch., and Where Have All The Ethics Gone? presented by Richard H. Rooley, FREng

ASHRAE's Residential Building Committee is seeking liaisons from TCs. This group seeks to increase ASHRAE's impact on the residential building community. I would like to hear from any members interested in acting as a liaison to this group, and it looks like a good avenue for advancement within the Society.

Research Advisory Panel (of Research Administration Committee) emailed a questionnaire Share Your Input for ASHRAE Research on Jan 13. Please participate.

TC 5.2 has been working with over-the-web access to some of its in-person meetings. This is something we might experiment with at the Austin Summer Meeting.

Liaison Reports

6. ASHRAE Learning Institute (Paul Pieper)

The courses continue to be offered approximately twice per year. Usually at the Winter meeting in-person and then again either during the Spring or Fall online series offered by ALI. In 2019, the course was presented during the 2019 Winter meeting and then again as part of the Spring Online series to good attendance. Since the annual meeting I have revised and updated the Best Practices presentation with the latest updates to standards and codes and incorporated additional updates to applications and some minor corrections. I am still in the process of revising the Fundamentals course (i.e. including alternating mass HX, controls etc.).

The course was presented again on Saturday Feb. 1. There were approximately 45 people in attendance; the vast majority were consultants, with some contractors and owner's representatives. I had excellent interaction with the students in attendance with questions throughout and at least 30 minutes of questions following the presentation. I feel like Saturday is an excellent day for this short course. Normally they are reserved for full day courses, so I feel like a revision to the Fundamentals course, and presenting these back to back on Saturday would be ideal.

7. SSPC 90.1

a. SSPC 90.1 Activities – (Adam Fecteau)

The 2019 version of ASHRAE 90.1 was published in October of 2019. It incorporates (4) addenda related to ERV:

Addendum DN, clarifies that exception 3 only applies to climate zone 5 to 8. It also defines the Series Energy Recovery Ratio (SERR) for in Series Energy Recovery with a cooling coil. It sets a minimal SERR of 40% in exception 7.

Addendum H clarifies that the ERR requirement of 50% is for both heating and cooling in specified climate zones.

Addendum AM gives designer the choice of using either a total energy ERV or a sensible energy only ERV for pools. It also allows the designer not to use an ERV if the pool's water is only heated with energy from the dehumidification system.

Addendum AY requires an ERV for all the dwelling units in scope of 90.1.

Addendum CD that gives guidance for by-pass damper and free cooling didn't make the 2019 version due to procedural deadline. It will be in the 2022 version.

The progress indicators for the 2019 version of the standard was presented during the Orlando meeting. The 2019 version uses 37.6% less energy than the 2004 version, and uses 5% less energy and 4.7% energy cost than the 2016 version. DOE's official determination is pending.

During the Atlanta fall meeting, Addendum A was voted for publication for public review. Addendum A specifies minimum fan efficacy for small fans of less than 180 W electrical input of 1/12 HP motor nameplate. It prescribes a 1.2 CFM/W fan efficacy for ERVs, calculated as airflow volume of one airstream divided by total input power to the unit.

There were no addenda proposed or discussed during the Orlando meeting that would impact the ERV industry.

b. HVI/TC5.5 Working Group (Mo Afshin)

The HVI/TC5.5 Working Group was originally formed to pursue changes to 90.1 that ultimately resulted in addendum ay.

Mo Afshin recommended the committee to dissolve this working group.

A motion to dissolve the working group was proposed by Adam Fecteau, seconded by John Bade.

MOTION CARRIED with (10) yes, (0) no, Chair Not Voting

8. Standard 62.1 (Mo Afshin)

a. Addendum p:

What it is: The current standard contains exceptions for leakage from energy recovery systems. These exceptions have been misinterpreted and misapplied. The current definition of energy recovery ventilation systems is not used, and the term energy recovery device is not defined. The definition is therefore modified.

Informative note added to define EATR.

It is clarified that the recirculation air must not be accounted as ventilation air.

Status: approved and published

b. Addendum ag:

What is it: Addendum based on a research project to define min separation distance calculation between intake and exhaust to replace tables B2-1 and B2-2

Status: committee voted and approved to send this for further study (there were multiple errors in the original study)

c. Addendum ak:

What is it: Recirculated Class 2 air shall not exceed 5% of the outdoor air intake flow.

Status: committee voted and approved to withdraw from consideration for publication

Note: this may come back if supported by more data, perhaps from a research study.

d. DA-98:

What is it: Recirculated Class 3 air shall not exceed 0% of the outdoor air intake flow.

Status: this will follow the same path as addendum ak (discontinued)

Note: this may come back if supported by more data, perhaps from a research study.

- e. **Recommendation:** ventilation Sub Committee recommends the Research and Education SC to start a RTAR for minimum separation distance for single units (AHUs), by providing more information. TC 4.3 might be interested in doing this (maybe our TC?), as it is not common for standard 62.1 to start an RTAR.
9. Standard 205 Working Group (Kristin Sullivan)
- We've formed a working group with members from TC 5.5 and SPC 205 and met twice by webmeeting since Kansas City. We've identified technologies that are in scope, but have not yet decided how many Representation Specifications will be needed to accurately define those technologies. In-scope technologies are sensible-only wheels, energy recovery wheels, sensible-only fixed plate, membrane core fixed plate, heat pipes, and runaround loops.
- SPC 205 met Tuesday morning. Kristin presented a Representation Specification for a generic ERV. The next step will be to draft a Representation Specification and review it with the working group to start making decisions about what variables will be included in ERV data and how to cover the in-scope technologies with Representation Specifications.
10. Technical Activities Council (TAC) Liaison Presentation (Larry Smith) [30 minutes]
- Larry Smith reported that two committees in Section 5 are planning to merge together. A survey was done by TAC chair. Recap of chair activities: 1.5 years ago, data was gathered on the amount of time used for face to face meetings. Since then the time used by TC's is reduced by 25%.
- The TAC liaison asked: what you think would improve the operation of this TC in the future:
- John Bade: web meetings for subcommittee meetings
- Matthew Friedlander; there are conflicts between the TC 5.5 meeting time and two other TC meetings that have mutual members.

Subcommittee Reports

11. Handbook (G.D. Mathur, Prakash Dhamshala)
- a. The updated handbook chapter will be published in May-June 2020
 - b. GD brought hard copies of the chapter
 - c. Time scale for future update: about 4 years
 - d. The 5-year strategic plan document (exhibit b) has a very prescriptive section on plan for handbooks
 - e. ACTION -> Matthew Friedlander to distribute the electronic copy of the chapter with voting members
12. Program (Ronnie Moffit) –
- a. Orlando: Tuesday 2/4 11:00 AM - 12:30 PM Seminar 53 (Intermediate) Impact of Revised Standards an HRV/ERV
 - b. Austin:
 - i. Monday, February 10, 2020 Program (Seminar, Forum, Workshop, Debate and Panel) and Extended Abstract Paper Due
 - 1. Presentation #1: Exhaust Energy Recovery “The Terms, Components, Control”
- Track Fundamentals and Applications: Presentation as discussed in strategic planning, idea to use at Chapter level by others
- Need to verify title, content providers, speakers.
- a. Black Box view of energy recovery exchanger— how its performance is characterized
 - Performance terms (AHRI 1060)
 - MOT ASHRAE 84

- Enthalpy recovery Ratio definition
 - Recovery efficiency ratio
 - b. High level Overview of technology / exchanger types.
 - Counter flow fixed exchanger
 - Cross flow fixed exchanger
 - Rotary counter flow exchanger
 - Recuperators
 - Heatpipes
 - c. High level overview of exhaust energy recovery control
 - Cooling/heating/ no recovery modes
 - Capacity modulation at part load
 - Frost avoidance
 - Airside Economizing allowance
2. Presentation #2: Additional Seminar presentation with speakers for TC to consider
 Track: HVAC&R Systems and Equipment:
 Title: Using Exhaust Air Energy Recovery for more than Energy Recovery
 This Seminar will look at two different examples of utilizing the energy from the exhaust air of a building. One example will show how recovered energy can be used to humidify a building, the other how it can be used to help cool a building:
- a. Adiabatic Humidification with Heat Recovery for VAV Design by C. Mike Scofield PE, FASHRAE North Bay Operations Conservation Mechanical Systems, Inc.
 - b. Potential Enhancement of Air-To-Air Energy Recovery by Use of Indirect Evaporative Cooler (M-Cycle) by Dr. Prakash Dhamshala UT Chattanooga

13. Research (John Dieckmann)

- a. 1799-TRP Validation of Extrapolation of Performance Rating Test Results for Small Energy Exchangers to Large Exchangers:

The work statement was approved by the Research Administration Committee (RAC) in final form late this past Summer and was sent out for bid on October 15th, 2019. (4) proposals were received by the Dec 16th deadline. On January 22nd, the PES (Dieckmann, Afshin, Fecteau, and Wang) plus our Research Liaison Dennis Loveday and the RAC secondary reviewer, Steve Kujak, had a conference call to discuss the proposals and select the recommended contractor. The recommended contractor was selected (not disclosed here to comply with ASHRAE Research confidentially required prior to contract award). At the TC 5.5 meeting on Feb 4th, the TC needs to approve the selection of this contractor, which will be addressed in executive session. Following the vote, the TC5.5 Chair needs to sign and forward the Summary Sheet for Reporting Evaluation of Proposals to MORTS (Mike Vaughn) by midnight tonight (Feb 4th). The selection still must be approved by RAC at the Spring RAC meeting. Then the contract should be signed in April.

- b. Standard 205 Energy Recovery Working Group:

The Standard 205 ERV working group is chaired by Kristin Sullivan, who reported in detail. A conference call was held shortly after the Annual Meeting and a follow-up conference call of the working group held on January 13th. A key point of the discussion was looking into using the AHRI certification parameters as the “grid” variables for a multidimensional map-based performance model. There was also discussion of whether

multi-dimensional maps should be the only way to model energy recovery exchanger performance within the context of Std 205.

c. Improved Energy Recovery Models:

On hold for now, pending consideration of the implications of Standard 205 on the approach we should take to modeling.

d. Review of transition duct section geometry for Energy Recovery Exchanger Testing:

We haven't started on this yet. The question is whether the transition duct geometries for connecting ERV test loop ducts to the entering and leaving faces of the energy recovery exchanger under test provide adequately even flow distribution across the faces of the exchanger (or less likely, maybe are overkill).

e. 1780-TRP-R Contaminant Transfer:

A few meetings back, TC 5.5 declined to cosponsor this project, given our focus primarily on HVAC applications for normally occupied spaces, as opposed to laboratory ventilation related. It had been put out for bid about a year ago and none of the proposals were acceptable. The work statement was sent out for rebid in October (I don't know if it was revised or not). I spoke with Donna Daniel to ask how many proposals were received, but confidentiality requires not disclosing that outside the PES for that project. Nominal schedule is to select contractor and get contract out in April, but the status of all of this is nominally confidential. Perhaps someone in our TC knows something more?

14. Standards (Matthew Friedlander)

ASHRAE Standard 84 "Method of Test for Air-to-Air Heat/Energy Exchangers" is the only standard for which TC5.5 is responsible. This standard is used world-wide and is evolving as the applications and technologies evolve. As of January 2020 it is in publication galley preparation. The Standards Preparation Committee (SPC) will be disbanded upon publication. To complete its work, the SPC will prepare written recommendations to the TC as to activities including research, and recommended action for the next revision cycle. The presentations will be presented at the 2020 Winter or Summer Meetings.

15. Website (Brandon Damas)

Brandon was absent in this meeting and no report was provided

16. Membership (Matthew Friedlander)

- a. We have a challenge in roster: 3 voting members rolling off
- b. Looking to replace voting members
- c. Kristin rolling in as secretary in 2020-2021

Discussion of Strategic Plan

The Chair distributed the Strategic Plan document to TC members prior to the meeting. Following was discussed during the meeting:

- a. Next meeting (Austin) would be a good time to vote on strategic plan
- b. Suggestions from members:
 - a. Marcus Darcy: the distributed document could be used as guiding principles
 - b. Drake Erbe: Should our focus be only on TC 5.5 or should we broaden our vision to the global society?
- c. Volunteers interested to participate and draft the executive summary: Marcus Darcy, John Dieckman, Drake Erbe

New Business

There was no new business.

Next Meeting

The TC5.5 main meeting will be at the Annual Meeting Tuesday, June 30, 2020, in Austin, TX.

The TC entered into Executive Session.

After discussion, a motion was made by Mo Afshin and seconded by John Bade to approve the selected contractor by PMS (Intertek in collaboration with University of Northern Carolina). This contractor was the low-cost bidder. In an executive meeting:

MOTION CARRIED (10) in favor, none opposed, Chair Not Voting

- Mo Afshin, Secretary TC 5.5, February 20, 2020



TC Sign-in Sheet

Meeting Information: TC 5.5 Date: Feb 4th, 2020

Name	Company	Committee Participation	E-mail Address	Young Eng. In ASHRAE (YEA)?
TJ Farrell	Intertek		terence.farrell@intertek.com	Y
Yiteng Ma	Swegon		Yi.teng@swegon.com	Y
Chris Glover	Airchange		Chris@airchange.com	N
SCOTT LAURILA	GREEN HEAT		scott.laurila@greenheat.com	N
Nicole Lantieri	AIRB		nlantieri@airnet.org	Y
MARK LONG	SYSTEMAIR		MARK.LONG@SYSTEMAIR.NET	N
Carl Jones	W.L. Garcia & Assoc.		cjones@wlgarcia.com	N
John Trauba	W.L. Gore		JTROUBA@WLGORE.COM	N
Sealot Khan	Texas A&M Univ		snk46@tamu.edu	
Billy Austin	Shultz Engineering	Corres Member	baustin@shultzeg.com	N
ONIVAN TAMUNOBRE	HEAT PIPE TECHNOLOGY		tam@heatpipe.com	N
DRAKE ERBE	AIRCHANGE	VM	DRAKEERBE@AIRCHANGE.COM	N
Matthew Friedlander	Renewair	VM		N

For Committee Participation: V = Voting; CM = Corresponding Member; PCM = Provisional Corresponding Member; G = Guest



TC Sign-in Sheet

Meeting Information: TC 5.5 Date: Feb. 4th, 2020

Name	Company	Committee Participation	E-mail Address	Young Eng. In ASHRAE (YEA)?
Adam Fecteau	Aldes	V	adam.fecteau@aldes.com	Y
G.D MATHUR	CALSONIC KANISER	N/CM	gd.mathur@marelli.com	N
Prakash DHANSHALIA	UTC	CM	Prakash-Dhanshali@ulc.edu	Y
MARCUS DISNEY	HEAT PIPE TECHNOLOGY	V	MARCUS@heatpipe.com	N
Carey Simonson	UL of Saskatchewan	V	Carey.Simonson@usask.ca	N
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Marc Tardif	Innersys tech	V	tardifm@innersystech.com	N
John Bolster	Solution Air	N/CM	jbolster@solutionairgroup.com	-
Mo Afshin	Core Energy	CM	mo.afshin@gmail.com	Y
Ronnie Moffitt	Trane	CM	rmoffitt@trane.com	N
Peter Grimbey	AT&T	CM	pgrimber@attbrands.com	N
Kristin Sullivan	Trane	VM	kristin_sullivan@trane.com	Y
John Badz	CHL POWER-AND-REF	UT. VM	johnbadz-osorio@ourbook.com	N
Andy Kebernik	Temple North America	CM	akebernik@templenorthamerica.com	Y
C. Mike Scofield	CMS	CM	cmscofield@AOL.com	N

For Committee Participation: V = Voting; CM = Corresponding Member; PCM = Provisional Corresponding Member; G = Guest