

ASHRAE TC 5.5 Air-to-Air Energy Recovery
ASHRAE 2019 Annual Conference, Kansas City, MO
 June 22-26, 2019

| Events | Time | | Location* |
|---|------------------|-------------------|-------------------------------------|
| Seminar 22: Frost Control Strategies for Air-to-Air Energy Recovery | Monday, June 24 | 8:00 AM–9:30 AM | KCCC, 1st Floor, 2104A |
| SPC 84 Method of Testing Air-to-Air Heat/Energy Exchangers | Monday June 24 | 2:15 pm – 4:15 pm | Lobby, Wilson Room Marriott East |
| TC 5.5 Handbook, Program, and Research Subcommittees | Monday June 24 | 4:30 – 6:30 pm | Location: KCCC, 2210 |
| TC 5.5 Air-to-Air Energy Recovery | Tuesday, June 25 | 3:30 PM-6:00 pm | 2103C, KCCC |

Agenda TC 5.5 Full Meeting MINUTES

These Minutes were approved by a voice vote of TC5.5 on 2020/02/04 at the Orlando Winter Meeting.

1. Call to Order / Welcome

- a. Call to order at 15:37 CDT

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)

4. Roll Call of Voting Members as of 2019/6/25

- a. M. Friedlander, P. Dhamshala, J. Dieckmann, M. Afshin, M. D’Arcy, J. Piscopo, K. Sullivan, D. Erbe
- b. Quorum was met with 8 voting members.

| Name | Voting Status | Committee Position |
|---------------------|----------------------|-----------------------------|
| 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 |

5. Agenda Review

a. Chair's Remarks (Friedlander)

An initiative to re-organize the TC structure continues to be talked about. TC5.5 has expressed that it sees no other TC with which it should merge. However, the re-organization concept has some other elements which may be of interest for us:

- Joint sub-committee meetings
- Interim meetings held by webinar (TC5.5 has done this once in 2018 and twice in 2019). I'm interested in the idea of having a S/C Chair and Liaison Webmeeting about a month before each Annual Meeting.
- A new format for the Sunday morning chair/vice-chair training meetings: rather than be separated by Sections, all sections will meet together.
- Scheduling in blocks so that all TC meetings are in the afternoon and all technical sessions are in the morning.

The June 2019 Reorganization Update will be attached to the minutes.

6. Approval of Minutes

a. Webmeeting March 6, 2019

- i. **Motion to approve the March 6, 2019 minutes by A. Fecteau, 2nd by M. Afshin. Edits were proposed and incorporated. Motion passed (7-0-0-CNV)**

b. Webmeeting April 4, 2019

- i. **Motion to approve the April 4th, 2019 minutes by K. Sullivan, 2nd by M. Afshin. Motion passed (7-0-0-CNV).**

Liaison Reports

7. 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 presentation during the 2019 Winter meeting and then again as part of the Spring Online series to good attendance. As discussed during the Winter meeting, I am in the process of revising both presentations for organization and content (i.e. including alternating mass HX, controls etc.). This will likely involve about 1/3 of the content so will need to go through ALI channels before it can be approved. I will have a copy of both revised presentations available to the TC for the 2020 Winter meeting in Orlando.

8. SSPC 90.1 Liaison Reports

a. SSPC 90.1 Activities – (Adam Fecteau, Liaison)

1. The Kansas City meeting's main focus was to complete and finish all the existing and open business, mostly comment response and publication with knowledge of unresolved commenters, for the publication of the 2019 version of the standard.
2. There is a new proposed addendum in MSC regarding In-Series Energy recovery.
 - a. Still at the MSC level only.
 - b. Provides an exception to the reheat limitation if in-series energy recovery is used with the cooling coil
3. Comment response for Addendum CD, that relates to the ERV bypass damper, were voted.
 - a. Addendum received two comments.
 - b. One was Deferred, out of scope because it didn't comment on the content of the public review.
 - c. The second was rejected with a unanimous vote.
 - d. Commenters still have 30 days to appeal and remain unresolved. Unless commenters retract their comments, Addendum CD risks to not be part of the 2019 version.
4. Recent batch of public review generated a couple of comments regarding Air-cleaner
 - a. All comments were deferred, out of scope because they weren't commenting on text part of the public review

5. SSPC 90.1 chair was reappointed for an additional year. Mr. D. Erbe will be chair of SSPC 90.1 until June 30th, 2020. On July 1st, 2020, Mr. Don Brundage.
6. **ACTION:** Chair to explore the possible to change the traditional schedule in order to facilitate the collaboration with TC 8.10 – Dehumidification.

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

The task assigned to the WG has been completed. Discussion: whether to dissolve the WG.

Motion to congratulate the Working Group for its work and disband it immediately by M. Afshin, 2nd by D. Erbe. Motion Passed (7-0-0-CNV)

c. Standard 62.1 (Mo Afshin, Liaison)

The SSPC 62.1 committee had 6 webmeetings since the winter conference 2019 and met in person on 22nd and 23rd of June 2019 at ASHRAE annual conference.

Several addenda were proposed and sent to first publication public review in that period. The following addenda directly impact our TC:

BSR/ASHRAE Addendum p to ANSI/ASHRAE Standard 62.1-2016, Ventilation for Acceptable Indoor Air Quality (First Public Review Draft):

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.

- **Addendum p** was discussed at the 90.1 Building systems and equipment subcommittee and wording was added to the proposal to define the pressure differential as per AHRI 1060 – 2018. It was voted on at the subcommittee meeting and was approved to go to second publication public review.

Impact of this addendum on the TC 5.5 members: recirculated class 2 or class 3 air must not be counted as outside air; i.e. Net supply air must be used when designing for outside ventilation air if reclassifying Class 2 or Class 3 air.

BSR/ASHRAE Addendum ak to ANSI/ASHRAE Standard 62.1-2016, Ventilation for Acceptable Indoor Air Quality (First Public Review Draft):

This proposed addendum reduces the leakage of class 2 air into outdoor air from 10% to 5%. Leakage is measured as Exhaust Air Transfer Rate (EATR). From the AHRI-1060 database of air to air energy recovery: (1) Of the 670 plate and frame heat exchangers, 70 records show that the plates have exhaust air transfer ratio (EATR). The highest EATR = 3.7 (2) There are 1820 wheel records. 1040 of those are at 5% EATR or below. More than half of the certified products are below the threshold of 5% EATR. Further, fan orientation and pressure design can reduce or eliminate the EATR in the system design.

Addendum ak received several opposing comments, some from members of our TC. This addendum was not discussed at the committee meetings and was deferred to future webmeetings.

Impact of this addendum on the TC 5.5 members: when recovering energy from Class 2 air, maximum allowable EATR would change from 10% to 5%.

BSR/ASHRAE Addendum ag to ANSI/ASHRAE Standard 62.1-2016, Ventilation for Acceptable Indoor Air Quality (First Public Review Draft):

This proposed addendum replaces the calculation method in current Normative Appendix B2 (Separation of Exhaust Outlets and Outdoor Air Intakes) with a new method based upon ASHRAE RP-1635 (2016). This research was sponsored by ASHRAE TC 4.3. The purpose of this Research Project is to provide a simple, yet accurate procedure for calculating the minimum distance required between the outlet of an exhaust system and the outdoor air intake to a ventilation system to avoid re-entrainment of exhaust gases. The new procedure addresses the technical deficiencies in the simplified equations and tables that are currently in Standard 62.1-2016 and model building

Addendum ag was discussed at the 62.1 Building systems and equipment subcommittee and wording was added to exclude the packaged systems from the proposal. There was

math error in some constants used in the research proposal that were updated. The definitions that were deleted before and now are back. A definition is added for heated exhaust.

Subcommittee moved for the addendum to go for the second public review. Vote approved. Going ahead for second public review

The 62.1 IAQ Guideline Report and Plans subcommittee is working on a guideline for best practices. Not a standard. Targeted towards engineers. Target is new building design but can be applied for retrofit. Guideline for enhanced IAQ

The 62.1 Research and education subcommittee met twice at the annual conference 2019. The following draft proposals are on the go in this subcommittee that directly impact out TC:

- **DA 98:** this draft proposes to reduce the minimum leakage requirement for class 3 air to be reduced from 5% to 0%. A wording was recommended by Dennis Stanke to still allow minimum 5% for ERVs that ventilate single zones (class 3). This recommendation is not in the proposed wording yet. Research and education committee has decided to work on this draft in Orlando
- **DA 103:** this draft proposes a minimum distance between OA intake and EA outlet in “any” ventilation system (currently only for class1 air). There was a suggestion that the research and education subcommittee work with the systems and equipment subcommittee on this draft

Subcommittee Reports

9. Handbook (G.D. Mathur, Prakash Damshala)

The vision of ASHRAE’s strategic plan is to provide a healthy and sustainable built environment for all with minimum impact on climate change. There is also a very great concern about climate change (United Nation’s Report, October 8, 2018) from all walks of life including social, political, global and environmental groups.

The upgrades to the chapter covers the technologies related to air-to-air energy recovery that responds to the issues mentioned above economically and more efficiently.

- ASHRAE standard 90.1 along with its addenda emphasizes the use of economizers in most of the climate zones.
- Schematics of the different ways to provide frost control are presented.
- Effective use of the heat pipe in reducing the cooling load and reheat energy with an example is presented.
- A simple model to estimate the performance of the desiccant wheel along with nearly a dozen new references covers the major upgrades to the chapter.

The review draft of the upgraded chapter will be ready for committee’s review by July 10, if not earlier and all the corrections to incorporate comments re of the resulting from the review will be assimilated and submitted to ASHRAE in time.

- a. The TC recommends the Handbook subcommittee to focus their energy on proven technology instead of hypothetical emerging applications.

ACTION: Chair to schedule a webmeeting to discuss the handbook chapter and offer any participant to receive a copy prior. Ronnie M., Kristen S., John D., Carrey S., John B., Marcus D., Mo A., Matthew F. & Drake E. showed interest.

ACTION: Chair to send a draft of ASHRAE 84 to Handbook committee for their consideration to incorporate Fixed Bed Generator in to the Handbook Chapter.

10. Program (Ronnie Moffit, Chair)

This Meeting in Kansas City

TC 5.5 sponsored Seminar Frost Control Strategies for Air-to-Air Energy Recovery on Monday 6/24/19

Big Thank You to:

Chair Kristin Sullivan

Speaker Mo Afshin: Frost Formation and Defrost Strategies for Fixed-Plate Heat and Energy Recovery Ventilators

Speaker Marc Tardif: Heat Pipe Under Frosting Conditions

Speaker Tom Rice: Frost Prevention Methods on Energy Recovery Wheels

ASHRAE Winter Conference & AHR Expo Orlando, FL | February 1 – 5, 2020

Proposed Topics for TC 5.5

8. Standards, Guidelines and Codes Track: ASHRAE is a leader in the development of standards and guidelines pertaining to the indoor environment; these standards and guidelines are used to shape codes. This track invites submissions pertaining to standards for buildings, HVAC&R systems and IAQ

Track Chair: Lee Riback lee.riback@gmail.com

Proposals→

Session #1 1.5hr US Standards updates for ERVs (Chair Marc Tardiff)

Matthew Friedlander--- Standard 84 updates

Adam Fecteau---Standard 90.1 updates 25mi

Mo Afshin--- Standard 62.1

Session #2 1hr European Standards ERVs updates (Chair Matthew F.)

Update EN308 **Need speaker

Update ISO 21773 **Need speaker

Additional Topics requested by TAC section 5 for track #7, TC 5.5 has no proposal at this time:

7. Ventilation, IAQ and Air Distribution Systems Track: This track solicits submissions pertaining to the design, operation and study of ventilation and air distribution systems in residential and commercial buildings. The intersection of these systems with respect to indoor air quality and health effects are also of significant interest for this track. Track Chair: Robert Cox bob.cox@jacobs.com

Deadlines for Submittals:

Friday, June 7, 2019: Website Opens for Seminar, Workshop, Forum, Debate, and Panel Proposals

Friday, August 2, 2019: Seminar, Workshop, Forum, Debate, and Panel Proposals Due

Friday, August 26, 2019: Conference and Technical Paper Final Accept/Reject Notifications

Friday, October 4, 2019: Seminar, Workshop, Forum, Debate, and Panel Accept/Reject Notifications

2020 ASHRAE Annual Conference is in Austin, TX, June 27 -July 1

TC 5.5 has not had a conference paper in several meetings. A conference paper is similar to seminar but with mini-report that goes with the preso that will be peer reviewed. Encourage TC 5.5 members to submit an abstract. Due date:

Monday, August 12, 2019 Conference Paper Abstracts, Technical Papers and Paper Session Requests Due

11. Research (John Dieckmann)

TRP1799 (extrapolation of performance from small AAHX exchangers to large exchangers): The work statement was conditionally approved by RAC in a teleconference just before this meeting. Discussed with our Research Liaison at the research chairs breakfast meeting Monday morning. The conditions can be met fairly easily, we have a Sept 1 deadline to get the conditions squared away so it can go out to bid this Fall.

Improved energy recovery exchanger submodel(s): Slow progress by our working group, reviewing both latest Energy Plus users guide and the technical support document for 90.1 mechanical addenda.

ACTION: Secretary to send J. Dieckmann the list of research project idea from SPC 84 meeting of Kansas City.

12. Standards (Matthew Friedlander)

TC5.5 is responsible for a single standard: ASHRAE/ANSI Standard 84 "Method of Testing Air-to-Air Heat/Energy Exchangers".

The most recent edition published in 2013 has been under revision by SPC 84-2013R, which met first three years ago in St. Louis.

Primary goals of the work were to edit the standard into mandatory standards language, and to add a method of test for fixed-bed regenerators. This will be almost the first publication of a method of test for fixed-bed regenerators (parallel work led to its inclusion in C439-2018).

Four supportive comments with editorial suggestions were received during the recent publication draft public review period. The SPC reviewed the suggestions yesterday and responded with some editorial changes.

After a final comb-through for remaining formatting corrections, the draft will be circulated with a letter ballot to the SPC to approve publication, which should follow this year.

The SPC will be disbanded at or before the Orlando meeting. We discussed possible recommendations to TC5.5 with respect to future work on the Standard. These will be presented in Orlando, and we invite input from the TC at this time.

13. Website <http://tc0505.ashraetcs.org/> (Matthew Friedlander)

James Scudamore has asked to retire from the webmaster position as he is leaving the industry. We thank James for his support of TC5.5! Brandon Damas has volunteered to fill the position and we will transition him in shortly.

14. Membership (Matthew Friedlander)

Roster should shortly roll over to reflect the following positions and voting members:

| | | | |
|------------|-------------|----|-------------------------------|
| Chair | Friedlander | VM | Standards Chair |
| Vice-Chair | Fecteau | VM | (Liaison 90.1) |
| Secretary | Afshin | VM | (Liaison 62.1) |
| | Damshala | VM | Handbook Liaison and Co-Chair |
| | Dieckmann | VM | Research Chair |
| | Sullivan | VM | |
| | D'Arcy | VM | |
| | Erbe | VM | |

Piscipo VM
Damas VM Webmaster
Simonson VM
Moffitt NVM Program Chair
Scudamore will be removed as Webmaster and VM

Old Business

New Business

Motion to form a new working group to work on representation of ERV in SPC 205 to by K. Sullivan, 2nd M. Friedlander. Motion passed (7-0-0-CNV).

Group would potentially include K. Sullivan, M. Tardif, J. Dieckmann, R. Moffitt, M. Friedlander, M. Afshin D. Erbe and members from SPC 205

Next Meeting

Next face-to-face meetings will be at the Orlando, FL | February 1 – 5, 2020

Minutes prepared by Adam Fecteau 2019/07/02

Minutes submitted by Matthew Friedlander 2019/08/12

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 7/1/2019

| | | |
|---------------------|------------|-----------------------------|
| Matthew Friedlander | Voting | Chair/standards Subc h |
| Adam Fecteau | Non-voting | Vice Chair, 90.1 Liaison |
| 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 | Secretary, 62.1 Liaison |
| Marcus D'Arcy | Voting | Member |
| Drake Erbe | Voting | Member |
| James Piscopo | Voting | Member |
| Kristin Sullivan | Voting | Member |

Exhibit 3 Sign-in Sheets Main Committee Meeting and Sub-committee meeting



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TC Sign-in Sheet

Meeting Info: TC 5.5 Main Committee Meeting Date: 2019 June 25

| Name | Affiliation | E-mail | Member (Voting, Corresponding, or Guest?) | YEA Member? (Yes/No) |
|-------------------|-------------------------------|---------------------------|--|----------------------------|
| Kristin Sullivan | Ingersoll Rand | kristin_sullivan@irco.com | VM | Yes |
| Ronnie Moffitt | Trane | rmoffitt@trane.com | NVM | No |
| Nicole Lantano | AHRI | nlantano@ahrinet. only | Guest | Yes |
| Marc Tardif | Inness tech | tardifm@innesstech.com | NVM | No |
| Adam Fecteau | Aldes | adam.fecteau@aldes.com | NVM, secretary | Yes |
| John Dieckmann | TIAX LLC | dieckmann.j@tiaxllc.com | VM, Research | No |
| Carey Simonson | University of Saskatchewan | Carey.Simonson@usask.ca | Corresponding | No |
| Jim Piscopo | JACOBS | james.piscopo@gmail.com | VM | No |
| Prakash Dhanshala | UTC | Prakash-Dhanshala@utc.edu | VM | No |
| G.D. MATHUR | MARELLI | gd_mathur@ck-mail.com | CM | No |

TC5.5-Sign-in-Sheet Kansas City Main.docx

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| Name | Affiliation | E-mail | Member (Voting, Corresponding, or Guest?) | YEA Member? (Yes/No) |
|-----------------|-------------------------------------|-----------------------------|--|----------------------------|
| Stephen Wage | Intertek | stephen.wage@intertek.com | Guest | Y |
| Wongyu Choi | AHRI | wchoi@ahrinet.org | Guest | N |
| JOHN BAOZ | CAL INVESTOR OWNED UTILITIES | ON RECORD | CM | N |
| Kevin McGachy | Systemair | kevin.mcgachy@systemair.net | Guest | N |
| Mo Afshin | CORE E.R. | mo.afshin@core-life | VM | Y |
| Marcus D'Arcy | HPT | marcus@heatpipe.com | VM | N |
| Carsen Banister | National Research Council Canada | carsen.banister@nrc.ca | Guest | Y |
| Zidu Ma | Carrier | Zidu.Ma@UTC.com | CM | N |
| Loic ARÉS | Venmar Ventilation | aresl@venmar.ca | Guest | N |
| ANIRUDDH ROY | GOODMAN | ANIRUDDH.ROY@goodmanmfg.com | Guest | N |
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June 2019- TC Reorganization Update

We would like to thank everyone who took the time to submit feedback for our proposed plan- it has given us a lot of information to process! The biggest take-away for the Ad hoc, is that each functional group (FG - includes TCs, TGs, MTGs, and TRGs) is not in the same place. While there are some groups that would benefit from restructuring, others are very productive and could be used as best-practice models for other groups. So, we will be slightly redirecting our focus to be a little more all-encompassing.

First, our number one goal is still to utilize our members' time more efficiently and effectively. To this end, we will be looking at two logistical items:

1. Adjusting meeting times into a block schedule. We currently have many meetings happening at non-standard times which leads to conflicts in people's schedules and a very inefficient use of meeting space.
2. Looking into moving subcommittee meetings into a time slot on the same day, and maybe immediately before the main group meeting. This way, if someone can only attend for a few days, they can attend all meetings for a functional group.

In addition, functional groups will be working with their Section Heads in TAC to determine how to make their work more effective- what will it take to go from good to great? This may look like many things, including:

1. Possible mergers- many great ideas were suggested from TCs.
2. Possible joint subcommittee meetings
3. Holding interim meetings online
4. Updated mailing lists/ communications structures

Starting in Kansas City, we will be rolling out a new TC Chair/ Section Head Breakfast meeting structure, but it will continue to be at 6:30am on Sunday. Instead of having each section meet in its own room, we will be meeting in one of the larger ballroom-type rooms. Chairs and Vice-Chairs as well as program/ handbook subcommittee chairs will be invited to come. Participants will be seated by section. The agenda will include:

- Celebrations (Best Practice Highlights)
- Training
- Liaison Reports (Pub Ed Council, Members Council, RAC, Handbook, CEC)
- Section Discussions

We are hoping that this format will help us communicate more clearly, give us more time for training, and still allow both formal discussion time with our sections, as well as the opportunity to facilitate informal discussions.

Overall, we want you to know that TAC and the Section Heads will be looking at multiple ways to offer continuous leadership toward a more effective and efficient future. Stay tuned for more updates as we figure out the details, and reach out to your section head if you have any ideas for consideration. While some minor changes may roll out sooner, the earliest any major changes would occur would be in conjunction with the society year, at the annual conference in Austin, June 2020.

Best Regards,

Sarah Maston, Chair (sarah@greenfootprintsxcx.com)
 Victor Goldschmidt, TAC (creating2@earthlink.net)
 Thom Justice, TAC Chair (justfilter@yahoo.com)
 Tom Lawrence, TAC BOD ExO (lawrence@engr.uga.edu)

Barbara Minor, TAC (Barbara.H.Minor@chemours.com)
 Larry Smith, TAC (LarryS@li-hvac.com)
 Bill McQuade, Planning (BMcQuade@ahrinet.org)