

## TC5.5 Ad Hoc group to support ASHRAE Epidemic Task Force

Date: April 9, 2020

### DRAFT MINUTES

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

Called to order by Matthew Friedlander, Chair TC5.5, 8:06 am

**1. Appointment of Secretary**

Mo Afshin and Adam Fecteau agreed to take notes.

**2. Introduction of participants**

See list of invitees (attached). Chair went through the list for introductions

**3. Chair's statement:**

"This meeting will be conducted in accordance with ASHRAE's Code of Ethics (attached).

"ASHRAE's Epidemic Task Force has asked TC5.5 for support in responding to an HVAC engineer's concern that energy wheels could be sources of COVID-19 contamination. I have convened a specific group of individuals including non-members of TC5.5 and manufacturer representatives in an effort to provide rapid and informed response. This meeting does not comply with ASHRAE's notice requirements. This unusual action has been approved by the Section 5 head. I do not believe we can take votes in this meeting.

"It is my hope that we will be able to generate substantive statements of fact and if possible existing peer-reviewed literature addressing the issues raised. Following a framing statement by Jay Kohler, we will begin with a single three-minute statements from any participant that wishes to speak, then move to general discussion."

Seven participants asked to give statements.

**4. Framing Statement by Jay Kohler, member of ASHRAE Epidemic Task Force**

*(Paraphrased) "The ASHRAE Epidemic Task Force was recently created in response to the pandemic as it relates to the effects of HVAC on disease transmission in buildings. A request from an ASHRAE member was sent to the Task Force enquiring about one of the air-to-air energy recovery technologies and its impact on distributing the virus. The goal for this meeting is to review the risks, initiate a process to provide guidance on enthalpy wheel operation and see if any tests or research are required. Bill Bahnfleth (chair of the ASHRAE Epidemic Task Force) has indicated that urgency is important but a reasonable amount of time can be taken to provide a well-considered response."*

**5. Participant Statements (all paraphrased)**

*Drake Erbe (Airxchange, Chair of 90.1):*

*The focus should not be on the technology but the application. TC5.5 as a whole has taken a position against using energy recovery technologies with co-located ducts in spaces with Class 4*

*air. (Noted that) desiccant technology is based on adsorption not absorption. He noted that the use of the technology has been successful for over forty years when properly applied. He did not support limiting the operation of ERVs as a general response to COVID-19.*

*Adam Fecteau (Aldes, Vice Chair TC5.5):*

*Covid-19 is merely a new virus amongst a long list of virus that our hospital system shall be designed to account for virus dispersion. We should expect our hospital HVAC system to be able to deal with this new virus the same way it deals with the other known virus.*

*John Fischer (Semco):*

*A study is provided that shows the bacteria carry over is similar to SF6 tracer gas used to measure EATR. He reminded that most hospital use a lot of recirculated air with Hepa Filtration that is acceptable, and that wheel should be as well. Wheels also help in maintaining humidity and temperature that is important in limiting the effect of the virus.*

*Scott Laurilla (Greenheck):*

*Recirculated air when occurring wheels is minimal compared to air recirculation in systems that are not 100% outside air. Also potential for leakage is present in various ERV technologies and additionally with airhandling equipment in general so while the original questioner was focused*

*Ronnie Moffitt (Trane, TC 5.5 Program Chair):*

*Commented that contaminated rooms this technology is not used. Building designers have to use the proper technology for the proper application.*

*John Dieckman (TC5.5 Research Chair):*

*ERV devices need to be looked at in the over-all system not just as individual devices.*

*Carey Simonson (University of Saskatchewan):*

*Q: what to do with rotating wheels during the pandemic?*

*We need to save energy, but this is a special situation, this pandemic is worse than regular seasonal flu. The size of the particles have a big impact. Virus is the size of tobacco smoke and if that is a problem in wheels, so too may viruses. REHVA (Federation of European Heating, Ventilation and Air Conditioning Associations) has recommended that rotary exchangers be turned off during the pandemic.*

*Q: Should ASHRAE consider a research project?*

*I would recommend a research project on the transfer of virus-sized particles and viruses.*

## **6. Discussion (Paraphrased)**

Branden Damas, (HTS, TC5.5 webmaster) asked whether ASHRAE is looking for guidelines or research proposals. He suggested it may be more beneficial to go 100% outdoor air using wheels and their associated EATR than recirculated air with HEPA filters.

Jay Kohler expressed that both are of interest though on different timelines. Peered-reviewed literature is very desirable but expert opinions are also welcome when characterized is such. He suggested we put together whatever is useful immediately, and then think about long term.

Aaron Bentley (Semco) pointed out that REHVA had withdrawn their recommendation to turn off rotary exchangers.

Dave McDonald (Novelaire) stated that in the industry, there are many types of desiccant. A 3A desiccant has a pore size of 0.0003 micrometers, 4A desiccant has a pore size of 0.0004 micrometers, silica gels adsorption surfaces are up to 0.015 micrometers, all much smaller than the 10-60 micrometer range of aerosols, and considerably smaller than the molecular size of the virus (.06-.14 micrometers). He suggested to increase the ventilation rate with wheels rather than stopping them.

Additional discussion of aerosol diameters, virus diameters, desiccant adsorption site size, etc. in the context of possible capture mechanisms followed. Pressure differential between airstreams was discussed as the driving force for mass air transfer between airstreams.

Roland Charneux pointed out that in cold weather there is a risk of condensation and that re-evaporation might the re-introduce agents into the air.

It was mentioned that many energy wheels in these applications are equipped with speed controllers to modulate or turn off energy recovery when that reduces energy consumption.

The chair asked for comment as to how and where ERV is used in hospital applications. Rick Herman reported that energy wheels are rarely used in infectious wards and some standards say they cannot be used. Air from infectious isolation wards is fully exhausted to the outside. Energy wheels are used in general areas of hospitals. Supply air to infectious disease wards is filtered to MERV 15 and to locations with immune-compromised patients it is HEPA filtered. Air exhausted from these locations is not filtered when exhausted to the outside.

John Fischer (Semco) said that renowned laboratories currently researching vaccines for Covid-19 are using millions of CFM or ventilation air passing through energy wheels.

Carey Simonson proposed the following as outline for a TC 5.5 position statement:

- TC 5.5 believes that energy exchanger should continue to operate as designed and installed at the current time
- i. with a well-designed energy exchanger
- ii. with proper filtration, including HEPA filtration where needed
- iii. proper pressure controls
- iv. Energy recovery will reduce the energy cost and loss of thermal comfort, humidity control and health that would occur during an increase in outdoor ventilation
- v. This is based on in-house testing and experience.
- vi. Long Term: TC 5.5 would encourage peer-reviewed research.

## 7. Action Assignments

The chair stated that it is necessary to generate a consensus statement in the short term. The following participants volunteered to draft a statement:

**ACTION: Drake Erbe, John Dieckman, Carey Simonson, and John Fischer**

The chair requested that all participants circulate to him and the group any peer-reviewed literature or references, as well as non-peer reviewed studies. Participants should be careful to indicate whether the documents can be shared only within the group, or to a larger audience such as TC5.5.

**ACTION: all participants**

The chair stated that he would request action through the TC5.5 Research Subcommittee to make recommendations on possible research needs.

**ACTION: Chair**

The chair asked whether any participant could inquire with REHVA as to the basis of the initial and following recommendations on operation of energy wheels.

**ACTION: Drake Erbe to reach out to contacts at REHVA.**

Meeting was adjourned at 11:30 central time.

Minutes prepared by Mo Afshin, Adam Fecteau and Matthew Friedlander

Exhibit 1 - ASHRAE Code Of Ethics

Exhibit 2 - List of Invitees and Attendees

Exhibit 3 – Written statement from R Vijaykumar, Aerfil

Documents circulated before the meeting and available in Basecamp

<https://3.basecamp.com/3106353/buckets/8432838/vaults/2575243667>

TC5.5 Epidemic Task Force Draft agenda 2020-04

FW Covid-19 Letter of concern

Re entrainment data

ASHRAE Position Document Airborne Infectious Diseases

National Cancer Institute Bacterial Carryover

## **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 - List of Invitees and Attendees

Present?	Name	Affiliation	Contact
Yes	Matthew Friedlander	RenewAire	<a href="mailto:mfried@renewaire.com">mfried@renewaire.com</a>
Yes	Rick Herman	UMN	<a href="mailto:herma015@umn.edu">herma015@umn.edu</a>
Yes	Aaron Bentley	FläktGroup	<a href="mailto:aaron.bentley@flaktgroup.com">aaron.bentley@flaktgroup.com</a>
Yes	David McDonald	NovelAire	<a href="mailto:dmcdonald@novelaire.com">dmcdonald@novelaire.com</a>
Yes	John Fischer	SEMCO	<a href="mailto:john.fischer@flaktgroup.com">john.fischer@flaktgroup.com</a>
Yes	Mo Afshin		<a href="mailto:mj.afshin@gmail.com">mj.afshin@gmail.com</a>
Yes	Roland Charneux	Pageau Morel	<a href="mailto:rcharneux@pageaumorel.com">rcharneux@pageaumorel.com</a>
No	Tom Rice	(SEMCO)	<a href="mailto:thomas.rice@flaktgroup.com">thomas.rice@flaktgroup.com</a>
Yes	Fecteau Adam	Aldes	<a href="mailto:adam.fecteau@aldes.com">adam.fecteau@aldes.com</a>
Yes	Brandon Damas	HTS	<a href="mailto:(Brandon.Damas@hts.com)">(Brandon.Damas@hts.com)</a>
Yes	Carey Simonson Ph D P. Eng.	U of Saskatchewan	<a href="mailto:(carey.simonson@usask.ca)">'(carey.simonson@usask.ca)'</a>
No	Mr Chris Check	Greenheck	<a href="mailto:chris.check@greenheck.com">chris.check@greenheck.com</a>
Yes	John Dieckmann		<a href="mailto:dieckmannj@comcast.net">dieckmannj@comcast.net</a>
Yes	Drake Erbe	Airxchange	<a href="mailto:drakeerbe@airxchange.com">drakeerbe@airxchange.com</a>
No	Erdman, Eric	Greenheck	<a href="mailto:Eric.Erdman@greenheck.com">Eric.Erdman@greenheck.com</a>
Yes	Jay A Kohler	JCI	<a href="mailto:(jkohler9@comcast.net)">(jkohler9@comcast.net)</a>
Yes	Ms Kristin Rice Sullivan	Trane	<a href="mailto:kristin_sullivan@trane.com">kristin_sullivan@trane.com</a>
No	Larry Schoen	Schoen Engineering	<a href="mailto:_larry@schoenengineering.com">_larry@schoenengineering.com</a>
Yes	Larry A Smith	LI Hvac	<a href="mailto:larrys@li-hvac.com">larrys@li-hvac.com</a>
Yes	Nick Agopian	RenewAire	<a href="mailto:napopian@renewaire.com">napopian@renewaire.com</a>
Yes	Lantonio, Nicole	AHRI	<a href="mailto:NLantonio@ahrinet.org">NLantonio@ahrinet.org</a>
Yes	'Ronnie Moffitt	Trane	<a href="mailto:(rmoffitt@trane.com)">'(rmoffitt@trane.com)'</a>
Yes	Laurila, Scott	Greenheck	<a href="mailto:Scott.Laurila@greenheck.com">Scott.Laurila@greenheck.com</a>
Yes	Marc Tardif	Innergytech Inc	<a href="mailto:(tardifm@innergytech.com)">(tardifm@innergytech.com)</a>
No	Ken Mead	CDC	<a href="mailto:kcm3@cdc.gov">kcm3@cdc.gov</a>
No	Roger Lautz	AEI Engineering	<a href="mailto:rlautz@aeieng.com">rlautz@aeieng.com</a>
No	Vijaykumar	Aerfil	<a href="mailto:vijay@aerfil.com">vijay@aerfil.com</a>
Yes	Richard Taft	Airxchange	<a href="mailto:RichardTaft@airxchange.com">RichardTaft@airxchange.com</a>
Yes	Chris Stone	AHRI	<a href="mailto:cstone@ahri.net">cstone@ahri.net</a>

### **Exhibit 3 – Written statement from R Vijaykumar, Aerfil**

*Vijay prepared this statement for use in the meeting, but was not able to attend.*

I am not sure about the specifics of the HVC Engineer's concern. So my short take is from what I think you are looking for as a consensus response. My apologies if otherwise. Also, full disclosure. My expertise is particle mechanics, filtration and clean air for enclosed spaces and not energy wheels. So please take my views strictly from the point of view of particle behavior:

- From everything I know and have read, some return of exhaust air to the inlet is unavoidable. Usually these are very small as noted in the attache paper. Particles, both viable and inert, will be exposed to the inlet air in a similar proportion and could become re entrained.
- Virus is typically in the 100 nm size range. Typically particles of this size are very difficult to dislodge once collected.
- Some or all of these virus may be included inside larger, either due to high humidity or moisture, i.e., they could be encased in droplets which are then collected on the exhaust side. In this case, most likely the moisture will be adsorbed by the dessicant leaving dry virus, which will be hard to dislodge. Some the small fraction of the collected droplets will be large enough to be carried to the inlet side. The paper also concludes the same. In this case, a good fraction of the moisture will be most likely adsorbed in the dessicant leaving an even smaller fraction of larger virus entrained droplets to become re entrained in the air stream.
- Droplets and particles larger than 10000 nm settle out rather quickly, (0.6ft/min or more), which in most HVAC systems will be in the ductwork and before it reaches the occupied space.
- A reasonably high efficiency filter (>95% MPPS) and good air flow rates will take care of any potential virus leaks past the wheel, and also protect the clean side duct work. Contrary to what many in ASHRAE are recommending, the efficacy of MERV class filters are not measured below 300 nm. Extrapolating the data curves for a few filters show even high MERV filters to be less than 20% at 100nm.

In summary, from a particle point of view, virus re entrainment from an energy wheel, is possible but may not be as big a contributor to potential harm than leaks in building envelope, doors and windows, elevators, etc, and most of all from transmission between infected people.

Matt, hope this helps. Feel free to contact me if you have any questions. As an aside, thanks for sharing the ASHRAE position paper. As a matter of caution, they seem to use aerodynamic size and particle size loosely. For water droplets, they are the same; it can be quite different for other morphology or material. I have pointed this out before but have not received any response.