

## ASHRAE MEETING MINUTES Winter Conference - Orlando, FL

### TRG4.IAQP

### Indoor Air Quality Procedure Development

Day: [Sunday](#)

Location: [Hilton Orlando](#)

Date: [2 Feb 2020](#)

Tower: [not applicable](#)

Time: [10:30 - 12:00](#)

Room: [Lake Monroe B](#)

- =====
1. [Call to Order](#) (10:30). Introduction of guests and members
  2. [Roster](#):
    - [\(Voting\) Members \(13\)](#) - Marwa Zaatari, Robert Burkhead, Jim Dennison, Richard Fox, Elliot Horner, Chris Hseih, Gemma Kerr, Chang-Seo Lee, Caitlin Naske, Kathleen Owen, Charlie Seyffer, Erica Stewart, Scott Williams
    - [Corresponding Members \(3\)](#) - William Chadwick, Henry Greist, Brian Hafendorfer
    - [Provisional Corresponding Members \(28\)](#) - Anthony Abate, Dearest Arhelo, Victoria Binz, Mark Davidson, Adalto de Almeida, Nilesh Deshpande, Sama Fakhimi, Vivekanand Gaur, Moustafa Gelgel, Hina Gupta, Rajendra Kapoor, Gerald Kettler, Naveed Khan, Money Khanna, Michael Kienzle, Srinivas Kodea, Carlos Michels, Robert Miller, Shadi Nejem, Arpan Pal, Joseph Pessa, Omar Ramirez Hernandez, John Randtke, Jaganraj Rathinam, Sunil Sansaniwal, Michael Sherber, Gourish Sirdeshpande, Charles Wadell
    - [Research Liaison](#): David Claridge
  3. [Membership Present](#) - Voting Members Present (Quorum Present?)

[Members Present \(13\)](#): Marwa Zaatari, Robert Burkhead, Jim Dennison, Elliot Horner, Gemma Kerr, Chang-Seo Lee, Charlie Seyffer, Erica Stewart, Scott Williams, Richard Fox, Chris Hseih, Caitlin Naske, Kathleen Owen

[Members Absent \(0\)](#):

#### [Relevant Comments Regarding Voting Members](#):

1. Nick Agopian (current Vice-Chair) will roll-up to be Chair and not vote (as the Chair typically abstains from voting matters).

#### [Relevant Comments Regarding Non-Voting Members](#):

1. None.

[Voting Members Present](#): 13 (of 13) (as reflected in the Roll-Call)

Quorum Present?: [Yes](#)

[Motions: 1/2 x 13 ~ 6 members needed to be present for a Quorum]

A Quorum to conduct business meetings is established when the number of voting members present is four (4) or exceeds 1/2 of the number of total voting members of the committee, whichever is larger.]

<u>TRG4 Leadership</u>	<u>Current (2-yr/4-Meeting term)</u>	<u>after 7/1/2020</u>
Chair	Marwa Zaatari	Nick Agopian
Vice-Chair	Nick Agopian	Dean Tompkins
Secretary	Dean Tompkins	in-development

**Ethics Statement** (10:40) (and silence cell phones)

- The Chair (Marwa Zaatari) read the Ethics Statement aloud:

*“Commitment to the ASHRAE Code of Ethics – In this and all other ASHRAE meetings, we will act with honesty, fairness, courtesy, competence, integrity and respect for others, and we shall avoid all real or perceived conflicts of interests.”*

(See full Code of Ethics: <https://www.ashrae.org/about-ashrae/ashrae-code-of-ethics>.)

**4. Approval of Meeting Minutes** (10:45) from Summer Meeting (Kansas City, MO)

Actionable Task(s): **Formal Vote**  
Motion to: **Approve the Kansas City (23 June 2019) Meeting Minutes of the TRG4**  
Motion by: **Nick**  
2<sup>nd</sup>-ed by: **Charlie**  
Discussion: **none**

Voting Tally:

For: **12**; Against: **0**; Abstain: **1 (chair)**; Absent: **0** Total: **13**  
Motion: **Passed** [**12** > 6 (= 1/2 x **13**)]

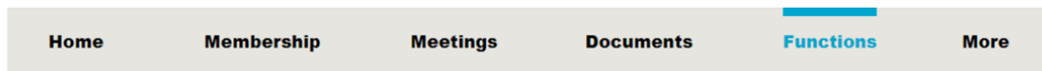
**5. Group Discussions** (10:45)

The SCOPE of the TRG4 is as follows:



**Indoor Air Quality Procedure Development**

ASHRAE Technical Resource Group TRG4.IAQ



**Scope of TRG4.IAQ**

TRG 4 is concerned with developing specific guidance to allow users to apply the IAQP method as defined under ASHRAE Standard 62.1. Committee results will be presented to the 62.1 Committee as submissions for inclusion in appendices of the Standard.

Source: <http://trg4iaq.ashraetcs.org/functions.php>

Discussion Order	Comment / Remark / Point of Discussion	Individual Speaking
1	opened general discussion with desire to change SCOPE of TRG4	M. Zaatari
2	support for expanding the SCOPE of the TRG4	S. Sherwood
3	it has taken 1 1/2 years to figure-out the inner workings of the 62.1 and the TRG4 committees	Other(s)
4	the TRG4 has developed a list of Design Compounds but that the 62.1 has its own list ... these two lists should be harmonized and that the 62.2 may have a list of compounds	J. Dennison
5	SSPC 189.1 has a list of compounds but does not recognize the IAQP method	G. Kerr
6	the history of the TRG4, but that the IAQP was "looked down at" with respect to the Ventilation Rate Procedure of Standard 62.1	C. Seyffer
7	the history of carbon adsorption and that it took 5 years to get a test method developed for that – Standard 145.1	N. Agopian
8	the TRG4 should provide information such as content for the addenda for 62.1. for reference: the SSPC 62.1 has been considering multiple addenda for 62.1 concerning the IAQP including: 1. <u>Addendum aa</u> : concerned with DCs, DLs, and evaluations (objective and subjective) 2. <u>Addendum ab</u> : concerned with indoor CO2 estimation 3. <u>Addendum ax</u> : concerned with ventilation for bioeffluents 4. <u>Addendum ay</u> : concerned with air cleaner efficiencies 5. <u>Addendum XX</u> : concerned with prohibition of by-product generation (formaldehyde and ozone)	M. Zaatari
9	60% of what he does is for the end user; 40% of what he does is for his business	C. Seyffer
10	discussed the needs of the IAQ procedure	M. Zaatari
11	questioned if the 62.1 is not the driving force of the IAQP. there has not been a test threshold that will demonstrate the performance of the electronic air cleaners	B. Burkhead
12	how would one incorporate the EAC into the Standard 145.2 test method? Recognized that the IAQP is about the 62.1 standard	T. Abate
13	if one would like to use the 62.1, then there is a need to listen to the TRG4	K. Owen
14	we have to address the IAQP within the context of its use in the 62.1 standard	J. Roseberry
15	believed that anything that the TRG4 accomplishes has to be for the benefit of the 62.1 standard	C. Seyffer

Discussion Order	Comment / Remark / Point of Discussion	Individual
16	believed that the TRG4 is a divided committee, with those individuals supporting the rationale to modify the IAQP procedure (see list of 5 addenda above) and those individuals that are resistant to modifying the IAQP procedure as presented in the five addenda mentioned above. Mentioned the possibility of creating a standard test method of 145.3	S. Sherwood
17	suggested that a Vision Statement be created for the TRG4.IAQP	M. Zaatari
18	mentioned the new addenda (see the list above)	M. Zaatari
19	the need to fine tune the IAQP to identify the true contaminants of concern	S. Sherwood
20	the salient features of design compounds that make the list: toxicity, widely appearing as compounds in the occupied space, they can be tested in test rigs	G. Kerr
21	the purpose of the IAQP is to provide content and guidance to the design engineer, stated that there is no need to change the SCOPE of the TRG4 but just work on what is needed (see Addenda listed above), emission rate data, certification list	E. Horner
22	stated "How do we get over the use of the IAQP and its associated fear factor?" ... the need for using the content in the IAQP and that the seller/manufacturer can "get the job." ... the need to get data incorporated into the IAQP	J. Roseberry
23	What needs to be developed?: an efficiency number – $\eta$ , in addition to emission rate data, by-product information, list of DCs	M. Zaatari
24	PM2.5 and MERV versus equivalence	B. McDonald
25	he never performed/designed and installation using the IAQP method, wherein one needed more than MERV13	C. Seyffer
26	if the IAQP were removed from the 62.1 and one used the VRP, identifying pollutants would still be missing	P. Wargocki
27	should have a subjective and an objective test to prove an installation is effective	M. Zaatari
28	the history of the IAQP was based on a few select indoor air contaminants; design engineers want "bench marks"	P. Wargocki
29	software is available for the VRP but that software for the IAQP is not available; believes that this represents a problem	C. Waddell
30	Addendum aa has a list of pollutants and that there is a subjective evaluation therein; the mission of the TRG4 is to get the IAQP adopted; customers do not know that the IAQP exists; do not know about the IAQP calculation	M. Zaatari
31	the TRG4 needs to work closely with the SSPC 145.2 and TC 2.3; establish/assess exposure (effects of low toxicity, health, high prevalence in building)	P. Wargocki

Discussion Order	Comment / Remark / Point of Discussion	Individual
32	updating the IAQP method is needed; made appeal to obtain unanimous support to improve the standing of the IAQP	M. Zaatari
33	mentioned existing case studies (performed/authored by C. Bayer and B. Burroughs) that were used to demonstrate the application of the IAQP method	G. Kerr
34	need to use a legitimate test method, and that an Ef (gaseous filter efficiency) is not based on 145.2 testing but is still being used nonetheless	B. Burkhead
35	the IAQP <i>outline</i> is being considered for usage in the Standard 62.2 (residential dwellings); the Standard 62.2 has decided that it will investigate the use of an IAQP ... equivalent ventilation system has existed ... do not use the threshold limit value but rather try to assess a fixed amount of harm, such as an in terms of a Disability Adjusted Life Years (DALY) score; wherein only 3 to 5 contaminants that make a difference to DALY are necessary, with weightings/ weighting factors/; these contaminants might include (1) PM2.5, (2) formaldehyde, (3) products of combustion, (4) radon, and (5) ozone. A Relative Harm Equation or Relative Harm Index would be computed as a real-time measurement.	M. Sherman

## 6. Adjournment of the TRG4 Meeting (11:57)

Actionable Task(s): Formal Vote  
 Motion to: Adjourn the TRG4 Meeting  
 Motion by: Dean  
 2<sup>nd</sup>-ed by: Nick  
 Discussion: none

Voting Tally:

For: 12; Against: 0; Abstain: 1 (chair); Absent: 0 Total: 13

Motion: Passed [12 > 6 (= 1/2 x 13)]

Appendix – A (the information below is from previous meetings)

Table below describes the 4 groups.

Task Force 1 - Lead - Dean Tompkins	Task Force 2 - Lead - Jim Dennison	Task Force 3 - Lead - Marwa Zaatari	Task Force 4 - Lead - Scott Sherwood
Identify 145.2 efficiency test compound for each VOC listed in the Table 1 below.	Discuss PM <sub>2.5</sub> and ultrafine testing/limit.	Identify TRG4.IAQP Content (Docs, Graphics, Videos, etc.) and the Methods to successfully disseminate that Content for Education/Edification of the IAQP Method of Std. 62.1	Manufacturers Identify a means of communicate to Equipment Manufacturers

Present in Kansas City, MO	
Task Group #:	1
Title:	Standard 145.2 test compound
Activity:	Identify the appropriate challenge-gas species for each gas listed in Table 1 below.

Individual	Organization	Email
Charlene Bayer	Hygieia Sciences	<a href="mailto:charlene.bayer@gmail.com">charlene.bayer@gmail.com</a>
Gemma Kerr	Canada	<a href="mailto:gkashrae@magma.ca">gkashrae@magma.ca</a>
Erica Stewart	Kaiser Permanente	<a href="mailto:erica.stewart@kp.org">erica.stewart@kp.org</a>
Pawel Wargocki	Denmark Tech University	<a href="mailto:paw@byg.dtu.dk">paw@byg.dtu.dk</a>
Bob Miller	Top Products	<a href="mailto:Bob.Miller@TopProductInnovations.com">Bob.Miller@TopProductInnovations.com</a>
Richard Fox	Honeywell	<a href="mailto:rfox1956@gmail.com">rfox1956@gmail.com</a>
Dean Tompkins (Group 1 Lead)	Dean Tompkins Group	<a href="mailto:deantompkins45@gmail.com">deantompkins45@gmail.com</a>
Dan Mason	Bioclimatic	<a href="mailto:dmason@bioclimatic.com">dmason@bioclimatic.com</a>

Group 1 Lead (Dean Tompkins) Report: Activity in Kansas City as reported by Dean Tompkins for Task Group 1 (Standard 145.2 Test Compounds) includes:

- Group 1 Tasks Accomplished since Winter Meeting (Atlanta, GA):
  - Created an EXCEL-based [Spreadsheet](#) consisting of compounds from:
    - ASHRAE Standard 145.2-2016 (Table 6.1), and
    - DA-68 (Addenda aa – the Design Compounds in the *proposed* SSPC 62.1-2019).
  - Spreadsheet consisted of:

- relevant thermophysical properties (e.g., molecular weight, boiling point, dipole moment, among others),
- presence of the compound in the BASE Study (U.S. EPA Study from 1990s),
- vapor pressure (water vapor density), and
- Antoine Equation properties.
- Plot(s) were created of the boiling point versus molecular weight for the purpose of identifying the potential for clustering of these compounds within particular chemical families. Little to no apparent clustering was identified – [See the Appendix herein](#).
- Identified select compounds within chemical families that are preferred based on favorable properties and/or suitability for 145.1 testing
- Action Items
  - Will continue further development of the [Spreadsheet](#).
  - Will initiate an electronic tool to ease the book-keeping effort so that all TRG4 members can have access to the observations made by Group 1.

Present in Kansas City, MO	
Task Group #:	2
Title:	PM2.5/Ultrafine
Activity:	Discuss/Develop PM 2.5 and ultrafine testing/limit.

Individual	Organization	Email
Elliott Horner	UL Env & Sustainability	<a href="mailto:elliott.horner@ul.com">elliott.horner@ul.com</a>
Jim Dennison (Group 2 Lead)	Century	<a href="mailto:jim@centuryenvironmental.com">jim@centuryenvironmental.com</a>
Charlie Seyffer	Camfil	<a href="mailto:charlie.seyffer@camfil.com">charlie.seyffer@camfil.com</a>
Richard Fox	Honeywell	<a href="mailto:rfox1956@gmail.com">rfox1956@gmail.com</a>

Group 2 Lead (Jim Dennison) Report: Activity in Kansas City as reported by Jim Dennison for Task Group 2 (PM2.5 & Ultrafine Particles) includes:

- General Comments
  - Stated that PM2.5 proposed change is 12 µg/m<sup>3</sup>.
- Action Items
  - Will identify the methods appropriate for detection of PM2.5 via a literature search
  - Will develop a White Paper to report on the information found regarding the appropriate methods for detection of PM2.5.

Present in Kansas City, MO	
Task Group #:	3
Title:	IAQP dissemination
Activity:	Identify TRG4.IAQP content (docs, graphics, videos, etc.) and the methods to successfully disseminate that content for education/edification of the IAQP Method of Std. 62.1

Individual	Organization	Email
Marwa Zaatari (Group 3 Lead)	enVerid	<a href="mailto:mzaatari@enVerid.com">mzaatari@enVerid.com</a>
Alan Rosenberg	Top Product Innovations	<a href="mailto:alan.rosenberg@topproductinnovations.com">alan.rosenberg@topproductinnovations.com</a>
Scott Williams	Williams Build. Sys. Engr. PC	<a href="mailto:Scott.Williams@WbsEngr.com">Scott.Williams@WbsEngr.com</a>
Chris Hsieh	TRANE	<a href="mailto:chsieh@trane.com">chsieh@trane.com</a>
Michael Deru	NREL	<a href="mailto:michael.deru@nrel.gov">michael.deru@nrel.gov</a>
Nick Agopian	RenewAire	<a href="mailto:nagopian@renewaire.com">nagopian@renewaire.com</a>

Group 3 Lead (Marwa Zaatari) Report: Activity in Kansas City as reported by Marwa Zaatari for Task Group 3 (IAQP dissemination) includes:

- Action Items
  - Will reach out to the Chairman of SSPC 62.1 regarding the IAQP calculator.
  - Check the existing SSPC 62.1 General Educational presentation.
  - Check the status of the SSPC 62.1 User's Manual with the intent to provide feedback regarding IAQP.
  - Assemble existing IAQP calculators including efficiency use of different compounds.

Present in Kansas City, MO	
Task Group #:	4
Title:	Manufacturers
Activity:	In development

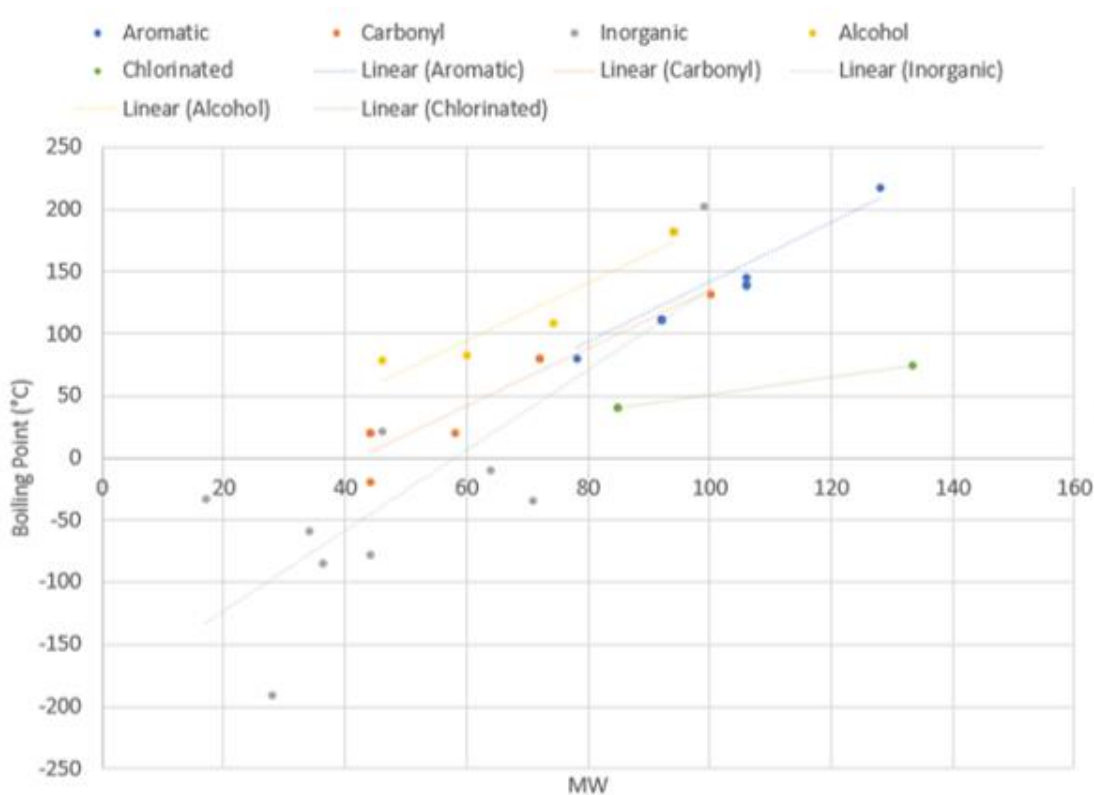
  

Individual	Organization	Email
Gerald Kettler	Std 202, 189.1, USGBC	<a href="mailto:gikettler@air-engineer.com">gikettler@air-engineer.com</a>
Nick Hurst	USEPA	<a href="mailto:hurst.nicholas@epa.gov">hurst.nicholas@epa.gov</a>
Joe Pessa	Dynamic AQS	<a href="mailto:jpessa@dynamicags.com">jpessa@dynamicags.com</a>
Randy Reed	NEC	<a href="mailto:randy@norbryhn.com">randy@norbryhn.com</a>
David Heidel	UVDI	<a href="mailto:david.heidel@uvdi.com">david.heidel@uvdi.com</a>
Jeffrey Roseberry	ProMark Associates	<a href="mailto:jeffr@promarkassociates.com">jeffr@promarkassociates.com</a>
Gourish Sirdeshpande	Armstrong World Ind.	<a href="mailto:gsirdeshpande@armstrong.com">gsirdeshpande@armstrong.com</a>
Michael Sherber	Plasma Air	<a href="mailto:msherber@plasma-air.com">msherber@plasma-air.com</a>
Ed Light	Building Dynamics	<a href="mailto:elight@building-dynamics.com">elight@building-dynamics.com</a>
Michael Orcutt	Cosatron	<a href="mailto:michael.orcutt@cosatron.com">michael.orcutt@cosatron.com</a>
Scott Sherwood (Group Lead)	EcoCare Corp.	<a href="mailto:ImproveYourAir@gmail.com">ImproveYourAir@gmail.com</a>

Group 4 Lead (Scott Sherwood) Report: Activity in Kansas City as reported by Scott Sherwood for Task Group 4 (Manufacturers) includes:

- General Comments
  - Any method of air cleaning should be permitted; these technologies include electronic air cleaning devices (EACDs) and coating(s) manufacturers.
  - Technology definitions are applicable to the specific technology involved.
  - Testing techniques need to include multi-pass testing.
- Akin to Action Items regarding Testing Approaches
  - Single pass and multiple pass results need to be compared: laboratory testing and field testing.
  - ISO Standard 16000-23 (Formaldehyde) and 16000-24 (VOCs) referenced a continuous stream of air passing through a chamber wherein one measures the contaminants that are returning from the chamber. If one conducts a test over a period of time, then one may be able to assess the longevity of the technology.
  - There are additional testing technologies that can be applied. Note that field testing is difficult based on the variables in the field.
  - New York City Department of Environmental Protection (NYC DEP) “Air Working Group” is currently regulating air contamination from kitchen exhaust. Scott Sherwood is the technical expert for this group due to his experience and understanding of Kitchen Exhaust Pollution Control Units.
    - Local Law Number 38 for the year 2015 amends Title 24 of the Administrative Code of the City of New York by adding a new Section 24-149.5, which provides that cooking stoves used at food service establishments shall be equipped with an emission control device for odors, smoke and particulates that meets the requirements of rules established by the department.”
  - Testing can be EPA Method 5, Appendix A-3 to 40 CFR Part 60, or EPA Method 202, Appendix M to 40 CFR Part 51, for particulate matter Field testing.

A plot of the boiling point versus molecular weight is shown in [Figure A.1](#). The purpose of identifying the potential for clustering of these compounds within particular chemical families.



[Figure A.1](#) Boiling point versus molecular weight as a function of class of compound.