



Draft Minutes - ASHRAE MEETING – Virtual, Summer 2021
TC 2.3 - Gaseous Air Contaminants/Removal Equipment
TC Meeting

Friday (06/11/21), 1:00 pm - 4:00 pm EDT
Zoom Meeting

Meeting membership attendee list is as follows:

| Last Name | Name | Member Status | Position | Present |
|-------------------------------------------|-----------------------------|---------------|------------------|---------|
| 13 out of 16 Voting Members in attendance | | | | |
| Abate | Mr. Anthony Abate | VM | Member | P |
| Bayer | Dr. Charlene W. Bayer, PhD | VM | Member | - |
| Choi | Dr. KJ Choi, PhD | VM | Program Chair | P |
| Flom | Mr. Mick Flom | VM | Member | P |
| Gaur | Dr. Vivekanand Gaur | VM | Member | - |
| Hingorani | Dr. Sanjeev Hingorani, PhD | VM | Chair | P |
| Kerr | Dr. Gemma Kerr, PhD | VM | Member | P |
| Krafthefer | Mr. Brian Krafthefer | VM | Handbook Chair | P |
| Kwong | Mr. Kevin Kwong | VM | Secretary | P |
| Lee | Dr. Chang-Seo Lee, PhD | VM-NQ | Member | P |
| Mathur | Dr. Ashish Mathur | VM | Member | P |
| Middlebrooks | Mr. Matt Middlebrooks | VM | Membership Chair | P |
| Roseberry | Mr. Jeffrey Roseberry | VM | Member | P |
| Sun | Dr. Christine Sun, PhD | VM-NQ | Member | - |
| Tronville | Dr. Paolo M. Tronville, PhD | VM | Member | P |
| Zhang | Dr. Jensen Zhang, PhD | VM | Member | P |

Summary of Motions

| # | Motion | Vote (For-Against-Abstain-Absent-Chair Voting Status) |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| 1 | Motion to approve the TC 2.3 minutes from Winter 2021 1 st – Tony Abate, 2 nd – Gemma Kerr | 12-0-0-3-CNV |
| 2 | Motion to accept sponsorship of RTAR: Determination of the CO2 and Aerosol Generation and Metabolic Rates of Occupants for Selected Indoor Activities 1 st – Ashish Mathur, 2 nd – Jensen Zhang | 11-0-1-3-CNV |
| 3 | Motion to accept sponsorship of RTAR: Effects of increased use of surface disinfectants and hand sanitizers on indoor air quality 1 st – Brian Krafthefer, 2 nd – Jensen Zhang | 11-0-1-3-CNV |
| 4 | Motion for the TC 2.3 Chair to communicate to ASHRAE that we would like virtual attendance capabilities available for in-person TC meetings 1 st – Gemma Kerr, 2 nd Brain Krafthefer | 10-0-0-6-CV |

1. Meeting was called to order by Chair @ 1:02pm

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- a. The Chair reviewed the ASHRAE Code of Ethics.
 - i. The ASHRAE Code of Ethics is to be adhered to by those doing ASHRAE business whether or not they are an ASHRAE member. The Code of Ethics can be reviewed at the below link.
 - ii. <https://www.ashrae.org/about-ashrae/ashrae-code-of-ethics>
 - iii. As members of ASHRAE or participants in ASHRAE activities we pledge to act with honesty, fairness, courtesy, competence, integrity, and respect for others in our conduct. We will avoid conflicts of interest, and behavior that is discriminatory and/or harassing.
 - b. Members and guests were encouraged to use the Zoom chat feature to enter their Name, Affiliation, Email Address, and YEA designation (if applicable) for meeting attendance records.
 - c. It was determined that there was a Quorum with 13 of 16 voting members present at roll call.
 - i. Dan Mason has stepped as a Voting Member due to company changes.
 - ii. Voting Members for this meeting: Charlene W Bayer, Sanjeev Hingorani, Brian Krafthefer, Kevin Kwong, Chang-Seo Lee V-NQ, Paolo Tronville, Tony Abate, Carolyn M Kerr, Jeffrey Roseberry, Christine Sun V-NQ, Kyung-Ju Choi, Daniel Mason, Matt Middlebrooks, Michael Flom, Vivekanand Gaur, Ashish Mathur, Jianshun Zhang.
 - iii. 16 Voting Members and 2 NQM
 - iv. > ½ Voting Members Present (9) (Yes – 13/16)
 - a. Absent: Charlene Bayer, Christine Sun, Vivekanand Gaur
 - d. Chair's Report
 - i. Thanks to the TC2.3 Leadership team (Brian, Caitlin, KJ, Kevin, Matt, Marwa, Marilyn, Michael, Paula, Tony), all Vice Chairs, Members & Participants.
 - ii. Gemma Kerr is the winner of the 2020-21 George B Hightower Technical Achievement award.
 1. This is the first Section 2 award recipient since inception of the award in 2003.
 - iii. AWARDS (Due date – September 1)
 1. ASHRAE GEORGE B. HIGHTOWER TECHNICAL ACHIEVEMENT AWARD
 2. SERVICE TO ASHRAE RESEARCH AWARD
 3. The Chair encouraged all members to nominate. TC 2.3 should collaborate with other TC groups.
 - iv. ASHRAE Winter Conference is listed on website to be in Las Vegas, NV Jan 29– Feb 2, 2020: Planning on face-to-face meeting
 1. AHRI has 95% commitment for the Expo.
 - v. ASHRAE encouraging doing interim meetings. New announcement procedure.
 1. TC interim meetings should be posted (by emailing the alias TCmeetings@ashrae.net) two weeks before an online meeting and four weeks before a face-to-face meeting. The person emailing should also include the meeting call-in info/ link for posting.
 2. ASHRAE Journal Newsletter (bimonthly) will remind our members to check the listing and to provide a link to the list.
 - vi. Open Mic for Upcoming meetings: Allows the ASHRAE membership to have a voice to express their concern and offer improvements. TAC meets the Saturday before the summer and winter conference and Wednesday at the conclusion of the conference. Send your request to ASKTAC@ASHRAE.net
 - vii. ASHRAE Encouraging using Basecamp for collaboration
 1. Should assign basecamp manager from the TC2.3 group
 - a. ASHRAE recommends the Webmaster to take over Basecamp.

2. New Training material on the website
- viii. All updated Training Material: <https://www.ashrae.org/technical-resources/technical-committees/tc-training-and-presentations>

- e. Reporting from ASHRAE liaisons.
 1. No ASHRAE liaisons were present.

2. Review and Approval of previous meeting minutes from Winter 2021-Virtual meeting.

- a. Tony Abate motioned to approve the TC 2.3 minutes from Winter 2021.
 - i. 2nd – Gemma Kerr
 - ii. 12-0-0-3-CNV (For-Against-Abstain-Absent-Chair Voting Status)
 - iii. Absent: Charlene Bayer, Christine Sun, Vivekanand Gaur

3. Summary of votes between meetings:

| | Topic | Sponsor/Co-sponsor | Vote Tally |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|----------------------------|
| 1 | <i>WS# 1869 Evaluation of VOCs with Respect to Development of Revised Standard 62.1 Indoor Air Quality Procedure (IAQP) Design Compounds and Design Limits</i> | <i>TC2.3 Sponsor</i> <i>Co-sponsor TRG4-IAQP, SSPC 62.1, SSPC 145, SSPC 189</i> | Passed 11-0-0-6-CNV |
| 2 | <i>RTAR: Improving test methods to measure air cleaner performance against airborne pathogens.</i> | <i>TC2.9 Sponsor</i> <i>Co-sponsor TC2.3, TC2.4</i> | Passed 11-1-0-5-CNV |

4. Items to be Voted on:

- a. RTAR: Determination of the CO₂ and Aerosol Generation and Metabolic Rates of Occupants for Selected Indoor Activities
 - i. Champion: Meng Kong
 - ii. Sponsor: TC 2.1
 - iii. Co-sponsors: TC 4.1, TC 9.6, TC 2.3, TC 2.4
 - iv. Ashish Mathur motioned to accept sponsorship of RTAR: Determination of the CO₂ and Aerosol Generation and Metabolic Rates of Occupants for Selected Indoor Activities
 1. 2nd – Jensen Zhang
 2. 11-0-1-3-CNV (For-Against-Abstain-Absent-Chair Voting Status)
 3. Abstain: Matt Middlebrooks
 4. Absent: Charlene Bayer, Christine Sun, Vivekanand Gaur
 - v. Nick suggested that SSPC 62.1 should also be a co-sponsor.
 - vi. Sanjeev will send comments to Meng
- b. RTAR: Effects of increased use of surface disinfectants and hand sanitizers on indoor air quality.
 - i. Champion: Chang-Seo Lee
 - ii. Sponsor: TC 2.3
 - iii. Co-sponsors: EHC, TC 2.9, SSPC 62.2
 - iv. Brian Krafthefer motioned to accept sponsorship of RTAR: Effects of increased use of surface disinfectants and hand sanitizers on indoor air quality
 1. 2nd – Jensen Zhang

2. 11-0-1-3-CNV (For-Against-Abstain-Absent-Chair Voting Status)
3. Abstain: Matt Middlebrooks
4. Absent: Charlene Bayer, Christine Sun, Vivekanand Gaur

5. Review of Action Items from Last Meeting

| # | Action Item | Owner | Meeting Initiated | Update from Summer 2021 (Virtual Meeting) | Status |
|---|-------------------------------------------------------------------------------------------------------------|------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1 | Workshop on performance rating system summary to be sent out. | Ashish Mathur | Atlanta | This Workshop was not accepted. We now have a Forum on combination technologies on June 28 th . Ashish will try resubmitting for Las Vegas. | Open |
| 2 | Collection of TC member bibliography papers for website posting | Marilyn Listvan | Atlanta | Gemma has found a collection of publications and will send this list to Sanjeev and Marwa. | Ongoing |
| 3 | Development of a course on gas phase filtration to be part of ASHRAE supported classes and send to chapters | Paula Levasseur | Atlanta | Presentations were given at the Winter 2021 meeting. These presentations are already ASHRAE approved. However, it is possible that ASHRAE would hold until the paid time-gate (1-year) is over before these presentations can be uploaded onto the website. | In-Process |
| 4 | Title/purpose /Scope for MTG or GPC on how to implement combined filtration systems | Brian Krafthefer | Houston | Brian will pick up on this work and send TPS to Matt, Kathleen, and Paula by the end of June. | Open |
| 5 | Twitter account | Caitlin Naske | Long Beach | Caitlin has been Tweeting upcoming meetings and when documents are uploaded to the TC 2.3 website. Caitlin has also been posting to the new Facebook page. Sanjeev will hand over Basecamp to Marwa and Caitlin. | Ongoing |
| 6 | ASHRAE Certification Program | Christine Sun | Orlando | No updates. | Ongoing |

6. Subcommittee Reports

- a. Research - Subcommittee Chair – Paula Levasseur
 - i. There was no Research Chair breakfast during the Summer 2021 meeting. Research funding remains in flux.
 - ii. 3 active research projects sponsored by TC 2.3 (RP-1720, RP-1579, and RP-1838)
 1. See TC 2.3 Research minutes for updates on individual RP, WS, and RTAR.

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- iii. Nick gave an update on the TC 2.3 co-sponsored RP-1780 "Test method to evaluate cross-contamination of gaseous contaminant within total energy recovery wheels"
 - 1. The PI has secured wheels for testing except for silica gel technologies.
 - 2. Early test results show an average bypass of 15-30% with a high of 60% bypass through wheels.
 - 3. The project should be wrapping up by the Las Vegas meeting.
 - 4. Nick will check with ASHRAE on sharing the presentation.
 - iv. New research ideas?
 - 1. The results from RP-1579 will lead to additional research topics.
 - 2. Nick commented that the RTAR on unvented combustion is still in the works. 62.2 is evaluating how much non-society funding is available. The total budget is over \$1MM.
 - v. Sanjeev reminded WS and RTAR authors to copy the TC 2.3 Research Chair on any requests for TC 2.3 co-sponsorship.
- b. Handbook - Subcommittee Chair -- Brian Krafthefer
- i. Chapter 11 "Air Contaminants" in ASHRAE Fundamentals.
 - 1. Michael will lead revisions on this Chapter.
 - 2. Revisions are due in 2025.
 - ii. Chapter 47 "Air Cleaners for Gaseous Contaminants" of ASHRAE HVAC Applications.
 - 1. Table 3 was discussed and modified.
 - 2. The subcommittee reviewed comments on the Chapter.
 - 3. Brian will send the latest revision out to the subcommittee by the end of July.
 - iii. Brian asked if interim Zoom subcommittee meetings need to be sent to the entire TC.
 - 1. Sanjeev recommended posting to the entire TC. Brian should send the meeting details to the TC 2.3 Chair and Vice-Chair for distribution.
 - iv. The next subcommittee meeting will be mid-August.
- c. Membership - Subcommittee Chair -- Matt Middlebrooks
- i. Matt shared his spreadsheet of the TC 2.3 membership.
 - ii. Currently 16 Voting Members.
 - 1. Six Voting Members rolling off in the summer: Charlene Bayer, Sanjeev Hingorani, Brian Krafthefer, Kevin Kwong, Chang-Seo Lee, Paolo Tronville
 - 2. Four Voting Members rolling on: Bob Burkhead, Mike Corbat, David Schaaf, Marwa Zaatari
 - iii. Matt also showed how to join TC 2.3 through the following ASHRAE link.
 - 1. https://eweb.ashrae.org/eweb/TS_ProvisionalSignup.html
- d. Planning - Subcommittee Chair -- Marwa Zaatari
- i. Future Planning meetings should be a longer timeslot.
 - ii. Kathleen provided an update from the ASHRAE ETF. There is a new guidance on in-room air cleaners. However, the guidance is focused on the current pandemic and there is not much focus on gaseous contaminant removal.
 - iii. Kevin provided an update on the TC 2.3 Roadmap and will try to finish by the end of July.
 - iv. There is a new MTG on combining multiple technologies and test methods for these types of air cleaners.
 - v. There was a lot of discussion on 3D printer emissions.
 - vi. Marwa will send Guideline 42P from SSPC 62.1. This document will go out for public review soon.
 - vii. Nick provided an update on TRG-IAQP. The next meeting will be June 22.



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- viii. The subcommittee discussed how to incorporate TC 2.3 into other ASHRAE activities. One idea was a journal article to draw attention to TC 2.3.
 - 1. Brian suggested putting TC 2.3 Public Relations as an update item on the Planning agenda.
 - ix. Gemma asked if we should hold an interim meeting for TC 2.3 Planning.
 - 1. Yes. Marwa and Kevin will discuss.
 - e. Program - Subcommittee Chair -- KJ Choi
 - i. Two seminars are sponsored for the Summer 2021 Virtual Conference.
 - 1. Seminar 7: COVID-19 Particle Removal by Air Filter Devices
 - 2. Seminar 14: Reducing Ozone: A Critical Factor in Improving IAQ
 - ii. One forum was sponsored.
 - 1. Forum 1: Is there a Magic Formula for Combining Multiple Air Cleaning Technologies to Improve Air Quality?
 - iii. One conference paper was sponsored.
 - 1. Conference Paper 6: Testing of Granular Air Cleaning Media for Ozone Removal in ASHRAE Standard 145.1
 - iv. Two seminars were submitted for Las Vegas
 - 1. "Emerging Gas-Phase Technologies"
 - 2. "Don't Gamble with IAQ: Guidance on Estimating and Monitoring the Performance of Gas-Phase Air Filters"
 - f. ASHRAE Learning Institute – Marilyn Listvan
 - i. ASHRAE is looking for new ideas and courses for ALI. These should be practical courses of broad interest and can be face-to-face seminars or instructor led courses.
 - ii. Example topics are:
 - 1. Fundamental for engineers new to the discipline
 - 2. Courses on new design guides
 - iii. Marwa has led a course with Hoy on the fundamentals of air cleaning for new engineers.
 - 1. The approval process through ASHRAE was simple.
 - 2. The course must be very practical.
 - 3. Marwa's course was 2-hours. However, it can vary from 1-, 2-, or 4-hours. You should prepare variations of the presentation.
 - iv. Brian recommended contacting the Fellows group for ideas.
 - g. Publications - Subcommittee Chair -- Marilyn Listvan
 - i. Marilyn updated the Facebook TC 2.3 Outreach page with relevant articles.
 - ii. Marilyn encouraged members to send in publication references.
 - h. Standards - Subcommittee Chair – Michael Sherber
 - i. Kathleen provided an update on the MTG for testing reactive air cleaners.
 - ii. SSPC 185.1 and 185.2 has no changes. There is a new 185.3 for a chamber test method. There is also a potential 185.4 on a UV test method for surface disinfection.
 - iii. AHAM is developing a gaseous contaminant chamber test method for in-room air cleaners.
 - i. Website - Subcommittee Chair -- Paula Levasseur (Incoming Chair - Caitlin Naske)
 - i. Caitlin has been updating the website with meeting minutes and agendas.

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- ii. There is some dated information in the Functions tab. Caitlin will reach out to the subcommittee chairs for updates.
 - iii. The website is very limited. For example, Caitlin is not able to create a new tab.
 - j. SSPC145 – Committee Chair – Tony Abate
 - i. The SSPC 145 meeting is upcoming on June 23.
 - ii. A major rewrite of the 145.2 test standard is underway.
 - iii. Nick asked if ASHRAE is putting together a group for electronic air cleaners?
 - 1. Gemma thinks this is Kathleen's MTG on reactive air cleaners.

7. Report from TC liaisons

- a. Hank Greist – TC 2.9
 - i. GPC 37 (Upper room UV-C) is meeting every 2 weeks.
 - ii. SSPC 185 is still working on maintaining 185.1 and 185.2. Most work in on 185.3.
 - iii. There was a recent approval of an IUVA and ASHRAE MOU. This outlines the objectives of the collaboration. One outcome is the beginning of a test standard for surface disinfection.
 - 1. Hank will send this test standard to Paula for review for any TC 2.3 relevance.
 - iv. There is a new RTAR on the increased use of disinfectants.
- b. Nick Agopian – 62.2
 - i. Unvented combustion devices are an ongoing discussion topic.
 - ii. There is interest in increasing the recommended MERV.
 - iii. Interest in focusing on indoor air quality within single- and multi-family homes to lower steady state concentrations.
- c. Nick Agopian – TC 5.5
 - i. Meeting is next week
- d. Nick Agopian – TRG-IAQP
 - i. Next meeting is June 22.
 - ii. The TRG will be upgraded to a full TC.
- e. Marwa Zaatari - 62.1
 - i. The main group has not met yet.
 - ii. The focus is on Addendum AA (IAQP).
 - iii. There are discussions on how the pandemic is impacting the test standard.
 - iv. One discussion topic is on the impacts of single event high pollutants (e.g. fires).
- f. Jensen Zhang – EHC
 - i. The meeting is on June 21.
 - ii. Marilyn suggested a new liaison since Jensen cannot attend.
 - 1. Marwa will be a member on EHC and volunteered to be the new liaison.
- g. Brian Krafthefer – TC 4.10
 - i. Two Work Statements went for votes.
 - ii. There is much work on publications within and outside of ASHRAE.



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- h. Tony Abate – TC 4.3
 - i. No updates. This TC has not met yet.
 - i. Dara Feddersen – TC 2.4
 - i. No meetings have taken place yet.
 - j. Kevin Kwong – U.S. TAG to ISO/TC 142
 - i. Working Group 8 (Gas-Phase Air Cleaning Devices)
 - 1. Open ballot for ISO/DIS 10121-3 “Test methods for assessing the performance of gas-phase air cleaning media and devices for general ventilation — Part 3: Classification system for GPACDs applied to treatment of outdoor air”
 - ii. Working Group 11 (Portable Room Air Cleaners)
 - 1. Joint working group (JWG17) with IEC/TC 59
 - a. ISO TC142/JWG11 Meeting – June 22, 2021.
 - 2. IEC 63086 “Household and similar electrical air cleaning appliances - Measurement of performance”
 - a. Sub Working Group 2 - Development of a Part 2-2 on Measurement of Reduction of Chemical Gases
 - b. SWG 2 met May 12, 2021.
 - c. Next meeting is scheduled for September 1, 2021.
 - k. Paula Levasseur – TC 9.1
 - i. No updates.
 - l. Brian Krafthefer – TC 2.1
 - i. Brian suggested adding TC 2.1 to the update list for future meetings.

8. New Business

- a. Gemma Kerr motioned for the TC 2.3 Chair to communicate to ASHRAE that we would like virtual attendance capabilities available for in-person TC meetings.
 - i. Seconded by Brian Krafthefer.
 - ii. 10-0-0-6-CV (For-Against-Abstain-Absent-Chair Voting Status)
 - iii. 6 absent are Charlene Bayer, Christine Sun, Vivek Gaur, Paolo Tronville, Ashish Mathur, and Matt Middlebrooks
- b. The committee thanked Sanjeev for his term as TC 2.3 Chair.

9. Agenda suggestions for the Winter Meeting in Las Vegas, NV, January 29–February 2, 2022

- a. No suggestions

10. The meeting was adjourned @ 3:41pm