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Recommendations from AIHA on Improving Indoor Air Quality for Occupant Health and Performance in Commercial Buildings

GSA Project # 47HAA022Q0184

Dear Mr. Kampschroer and Co-Directors Loftness and Hameen:

AIHA, the association for scientists and professionals committed to preserving and ensuring occupational and environmental health and safety (OEHS), appreciates the opportunity to provide feedback on the document entitled “Improving IAQ for Occupant Health & Performance in Commercial Buildings” (GSA Project # 47HAA022Q0184), produced by the Center for Building Performance and Diagnostics. We hope you find our feedback useful and are happy to answer any questions you may have.

Pollutants of Concern and Health Literature

Section 2.1 Particles generated outdoors and indoors (PM10, PM2.5, PM1 and below – superfine)

We suggest that from an impact drive approach to tracking particles, it may be more reasonable to additionally look at respirable fraction (the mass fraction of inhaled particles penetrating to the nonciliated airways) rather than individual PM1, PM2.5 and PM10, as this matters more when it comes to health impacts. We note that respirable fraction is slowly becoming more adopted in the field as a term to describe a particulate threshold.1
Section 2.4 Mold
Generally, there is an opportunity to separate this topic into two parts. The first part is preventing mold, where one aspect is simply monitoring the temperature and relative humidity to understand if the environment is set up for mold growth. This would be a preventive method. The second part is when there is mold growth. Then there is the reactive method as already mentioned in the document.ii

Regarding the statement on page 11, “While not all molds are toxic, there are four main types of visible mold in buildings:...”, a citation is needed. Furthermore, we recommend addressing whether the mold types listed are listed in relation to causation (e.g., water intrusion or moisture issues).

Regarding the statement on page 12:

“Depending on the environmental conditions at the location, the investigator is typically seeking to ascertain whether there are any notably higher indoor fungal levels that deviate from or are unusual compared to the outdoor microbial population.”

We note that this is a potentially misleading statement. Concentrations are only one aspect of data that are important.

Furthermore, regarding the following statement on page 13, “Unlike bacteria and virus contaminants, people are good sensors for mold concerns, with records of moldy or musty smells, damp surfaces, signs of past water damage, and actual mold growth conditions that should be addressed.” We recommend rewarding the statement as follows:

“Certain molds can create odors that people will easily detect. Odor thresholds vary, however, the odors related to dampness and materials breakdown are usually detected by individuals, especially those who have been previously affected by molds.”

Section 2.5 Pathogenic Viruses & Bacteria in the Air and on Surfaces
Regarding the statement following statement on page 14,

“In a 2021 epidemiological health study of college residences, classrooms, and laboratories in New Delhi, India, Kuma et al identified that culture-based sampling of bacterial and fungal aerosol concentrations ranging between 300-4150 CFU/m3 increased reported headaches (28%) and allergies (20%) in the winter season.”

We note that this is a limited citation and recommend using monographs from several publication searches or literature reviews. We further note that, in general, concentrations of total bacteria in excess of 1 million colony-forming units (cfu)/gram of dust may represent an unusual situation.
2.6 VOCs Including Formaldehyde (when indoors>outdoors)

We note that low levels of VOCs are ubiquitous in indoor and outdoor air from natural and human-made sources and have long been associated with health effects and nuisance odors.

Regarding the statement on page 18, “The threshold of concern for VOC and specifically Formaldehyde are being debated world-wide”, we recommend adding additional citations, such as the following:


HVAC System Configurations of Concern

To emphasize further on “IAQ performance KPI against thresholds at the building or zone level (e.g., CO2, PM)”, there should be an outlined expectation that every zone/room should be monitored. The battery-operated wireless sensors are today at a cost-level that is insignificant compared to the larger costs related to improving building performance.

KPIs for Improving Operations and Maintenance for IAQ

Section 4.6 Is a next generation BASE study of the Federal portfolio needed, with HVAC records, IEQ field measurements, and IAQ data analytics?

We strongly agree with the following statement on page 66,

“The BASE study could provide a structure for the Ventilation Verification Project (VVP) that began with 62 buildings and will expand to several hundred federal buildings. The use of consistent, expert field teams to gather data about HVAC system configurations, operational setpoints and fault detection, indoor air quality measurements and user perception, as well as corresponding energy demands, can
inform the new design and retrofits of commercial building system integration, management and operations.”

We recommend updating the study methods to include multi-zonal models and moisture evaluations at the building envelop and mechanical systems.

**DOAS (Separate Ventilation and Thermal) Retrofits with Electrification**

These subjects are not currently addressed in GSA Design Intent – GSA P100 – 2003 Part 1 for Mechanical Engineering Submission Requirements.

**Conclusion**

If you have any questions about AIHA’s comments on the document entitled “Improving IAQ for Occupant Health & Performance in Commercial Buildings” (GSA Project # 47HAA022Q0184) or other matters, please contact me at mames@aiha.org or (703) 846-0730. Thank you for your time and consideration.

Sincerely,

Mark Ames
Chief Advocacy Officer
AIHA

**About AIHA**

AIHA is the association for scientists and professionals committed to preserving and ensuring occupational and environmental health and safety in the workplace and community. Founded in 1939, we support our members with our expertise, networks, comprehensive education programs, and other products and services that help them maintain the highest professional and competency standards. More than half of AIHA’s nearly 8,500 members are Certified Industrial Hygienists, and many hold other professional designations. AIHA serves as a resource for those employed across the public and private sectors as well as to the communities in which they work. For more information, please visit [www.aiha.org](http://www.aiha.org).

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