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Position Paper

Measuring Matters: Deploying the Indoor Air Quality Procedure with Confidence

smartIAQ™

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smartIAQ™ is a breakthrough for confident adoption of the Indoor Air Quality Procedure (IAQP) by directly applying ASHRAE standards for indoor air quality. The solution goes further through closed loop air quality control ensuring air quality while achieving energy efficiency and first cost savings.

Indoor Air Quality Procedure and Ventilation System Design Considerations

The Indoor Air Quality Procedure (IAQP) in ASHRAE Standard 62.1 is significantly more prescriptive following updates in 2019 and 2022. Evolving from an alternative approach to a tightly defined methodology for designing mechanical ventilation systems, the IAQP allows outdoor airflow rates lower than the Ventilation Rate Procedure (VRP). The IAQP directs that healthy indoor air quality is achieved in designs that deliver source control, air cleaning, and outdoor air in the right proportions to limit contaminant accumulation in the breathing zone. This is an appealing approach because ASHRAE and field experience demonstrate that the IAQP reduces mechanical equipment cost and complexity, lowers HVAC energy use, and achieves healthy indoor air. Yet, adoption of the IAQP remains limited.

Following recent updates, nearly every design variable has a defined target and is supported by an ASHRAE-developed calculator. The standard has been strengthened through requirements for third-party validation of air cleaner safety and effectiveness [1], a position paper on CO_2 [2], and specific guidance on objective evaluation methods. So outdoor air reduction under the IAQP approach has never been easier or lower risk.

Adoption Slowed by Limited Validation

Despite this progress, some designers and owners are reluctant to adopt the IAQP because they fear a scenario where they may need more outdoor air. It is important to note that ASHRAE Standard 62.1 selects contaminant limits well-below OSHA and other safety standard levels and directs the use of independently validated air cleaning technology. Following that, the standard provides an objective evaluation (in 62.1 §7.3.1) to validate the IAQP design with laboratory-grade air quality sampling. While the specificity during design and validation after construction are helpful, designers and owners may consider long-term performance of an IAQP design when space use changes and equipment performance drifts.

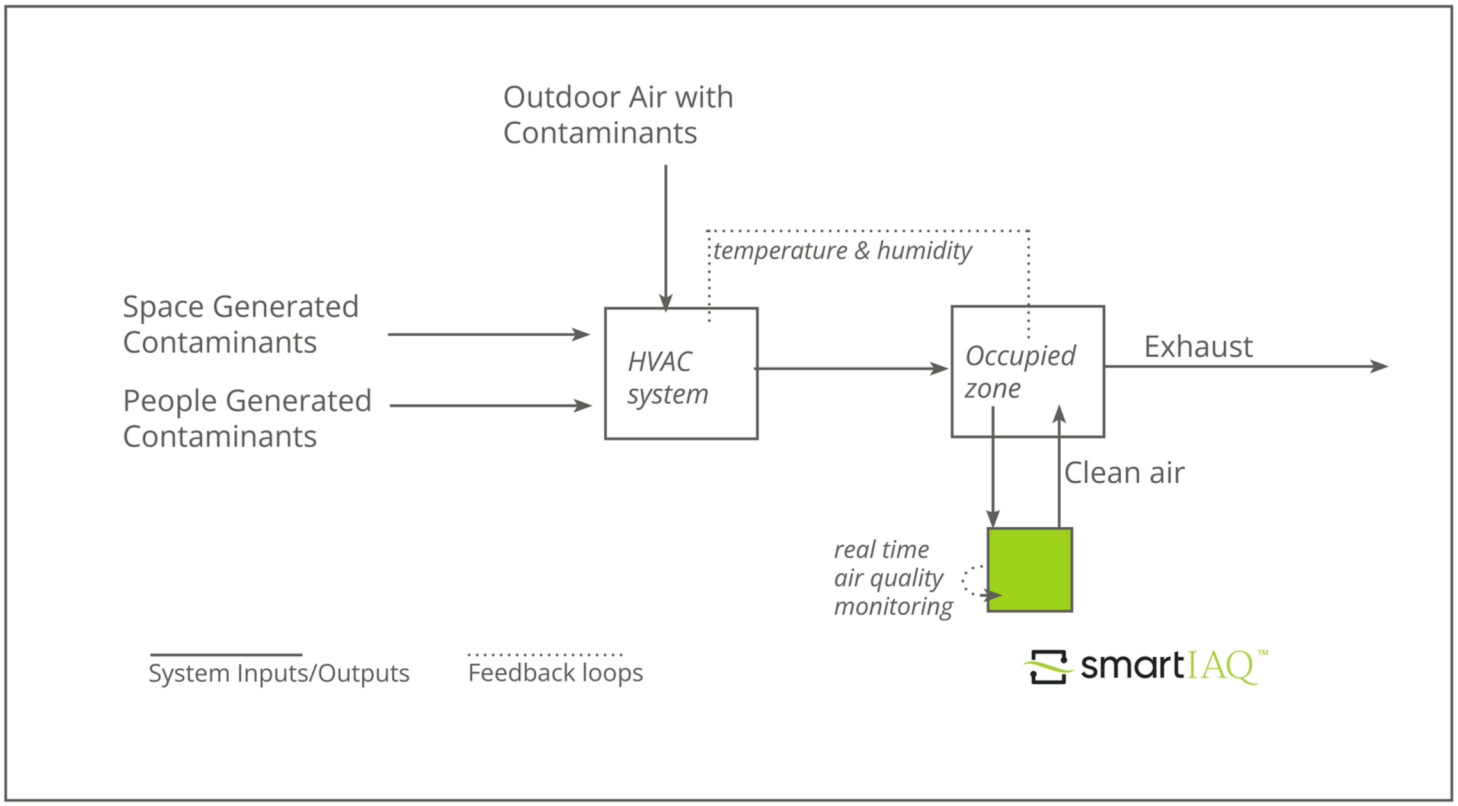
Long-term system performance is the IAQP's starkest challenge. As defined, the IAQP is open-loop. If conditions assumed in the IAQP mass balance equation are exceeded and/or air cleaner performance is compromised, the air quality of the space may be at risk. Open-loop operation generates the potential for system failure both in over and under performance. The solution is straight-forward, apply a product that is responsive to air quality conditions supported by traceability to prove compliance with the standard.

Confident IAQP Through Closed-Loop Control

Air quality feedback loops and responsive control is not novel. This is commonplace in temperature and humidity regulation. Doing so for air quality has traditionally required technology and human power that exceeds budgets. Integrated solid state sensing in smartIAQ™ solves this concern and closes the loop. Requiring no calibration, the air quality processor in smartIAQ rises to the challenge of the IAQP with validation and traceability.

As a clean air delivery device, smartIAQ is tested safe and effective by third party laboratories to ASHRAE Standards 145.2, 52.2, and 241. It is purpose-built for IAQP and measures air quality, ensuring continuous compliance to the standard. As contaminants increase, smartIAQ cleans more, as contaminants decrease, it idles to extend filter life. The fidelity and self-calibration of the integrated solid-state sensors in smartIAQ support this operation, requiring no additional installation cost or human intervention.

Integrated solid-state sensors and control logic drive the clean air response. The same logic also indicates when filters are at end of life or if an air quality anomaly is occurring, empowering facility leaders to respond. Taking the intelligence further, smartIAQ may also be integrated into and managed by a BMS via MODBUS or BACnet™. While other approaches and technologies may achieve the same result as smartIAQ, the integrated design and operating logic makes smartIAQ a simpler and more cost-effective solution.



Beyond the IAQP

Going beyond the limits of the IAQP, other standards like LEED v5 and the WELL Building Standard provide additional thresholds for air quality. smartIAQ may be factory-configured to the levels specified in these standards. In that case, smartIAQ conditions and monitors air quality to those levels ensuring compliance and traceability.

References

[1] ASHRAE Standard 62.1-2022 Addendum N September 30, 2022

[2] ASHRAE Position Paper on Indoor CO2 February 2, 2022