Fellowes
AIR QUALITY MANAGEMENT

Achieving ASHRAE 62.1 And 241 Compliance: How In-Room Air Cleaners Complement HVAC Systems

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1. Introduction

This paper examines how Fellowes Array air cleaners complement HVAC systems to help building owners, facilities managers, and HVAC designers achieve the requirements of ASHRAE 62.1 and ASHRAE 241—standards. Together they define how buildings maintain acceptable indoor air quality and prevent the spread of infectious aerosols.

Indoor air quality directly impacts occupant health, comfort, productivity, and overall sense of safety. For decades, ASHRAE Standard 62.1 has served as the foundation for designing buildings with acceptable indoor air quality, establishing minimum ventilation requirements with an emphasis on delivering fresh outdoor air to the breathing zone. This standard is currently required by most building codes.

The COVID-19 pandemic revealed a critical gap: ASHRAE 62.1 was not designed to address airborne pathogen control. In response, ASHRAE, in collaboration with the White House COVID-19 Response Team, introduced Standard 241, "Control of Infectious Aerosols," which establishes targeted strategies for reducing airborne infectious disease transmission. While ASHRAE 241 is not yet mandatory in most jurisdictions, adoption is accelerating—particularly in healthcare, education, and high-occupancy environments where infection control is critical to occupant safety.

Understanding both standards is essential, ASHRAE 62.1 provides the foundational framework for ventilation and acceptable indoor air quality; ASHRAE 241 builds upon it by addressing the specific risks associated with airborne infectious diseases. Compliance with 62.1 is a prerequisite for meeting 241 requirements.

2. Benefits of Air Cleaners for Infection Control

Occupant Benefits

Targeted Air Quality Enhancement: Delivers cleaner air precisely where it is needed, improving overall indoor air quality.

Infectious Aerosol Reduction: Effectively reduces or removes airborne viruses and bacteria through H13 HEPA filtration, lowering the risk of respiratory infections as outlined in ASHRAE 241.

Allergen Removal: Captures allergens to promote better health and comfort for occupants.

Productivity Boost: Creates healthier, more comfortable spaces, leading to fewer sick days and enhanced occupant productivity.

Regulatory Compliance Benefits

ASHRAE 62.1 Compliance:

- Fellowes H13 True HEPA filters exceed the MERV 8 minimum filtration requirements, ensuring superior particulate removal
    - Fellowes H13 HEPA filters capture 99.95% of particles down to 0.1 microns—significantly exceeding ASHRAE 62.1's MERV 8 minimum requirement (70-85% capture at 3-10 microns) and ASHRAE 241's MERV 13 recommendation (50-85% capture at 0.3-1.0 microns). This includes viruses, bacteria, allergens, and other airborne pathogens relevant to infection control.
- Fellowes Array air cleaners enhance air mixing and improve the distribution of clean air throughout the building, complementing HVAC systems

ASHRAE 241 Compliance:

- Fellowes Array air cleaners meet the IRMM (Infection Risk Management Mode) activated requirements for Equivalent Clean Airflow Rate (ECAi), supporting compliance with infection control standards

Reduced HVAC Load: Fellowes air cleaners supplement air cleaning efforts, reducing the reliance on total HVAC airflow and mitigating strain on HVAC systems by incorporating HEPA-level filtration (H13: approximately equivalent to MERV 17).

Improved Energy Efficiency: Enhances overall building energy performance by optimizing air purification and reducing ventilation demands.

Cost-Effective IAQ Solutions: Provides a practical and affordable means of achieving high indoor air quality standards without extensive system overhauls.

3. Overview of ASHRAE 62.1

ASHRAE Standard 62.1, "Ventilation for Acceptable Indoor Air Quality," establishes minimum ventilation and indoor air quality requirements for new and existing buildings, ensuring safe, healthy, and comfortable environments for occupants. Compliance with Standard 62.1 is a prerequisite for meeting the requirements of ASHRAE Standard 241.

Key Components

- Ventilation Rates: Specifies minimum outdoor airflow rates based on space type and occupancy levels, emphasizing the delivery of fresh air to occupied zones.

- Outdoor Air Quality: Mandates assessment of outdoor air quality to determine the need for treatment before introduction into the building's ventilation system.

- Systems and Equipment: Provides criteria for the design, installation, and maintenance of HVAC systems to ensure adequate airflow and contaminant control in occupied spaces.

- **Procedures:** Outlines methodologies for measuring and verifying ventilation rates and IAQ, including monitoring parameters such as carbon dioxide (CO_2), particulate matter (PM2.5), and volatile organic compounds (VOCs).

- **System Commissioning:** Details processes for verifying that HVAC systems are designed, installed, and operating in accordance with the standard's requirements.

- **Operations and Maintenance:** Emphasizes the importance of regular maintenance, including filter replacement and calibration of sensors, to sustain IAQ performance.

- **Documentation:** Requires comprehensive records of system design, installation, operational procedures, and maintenance activities to demonstrate compliance.

Compliance Procedures

Standard 62.1 offers two primary procedures for compliance:

1. **Ventilation Rate Procedure (VRP):** A prescriptive approach that specifies the quantity of outdoor air required based on occupancy and space function.

2. **Indoor Air Quality Procedure (IAQP):** A performance-based approach that allows for the use of engineered systems, such as air cleaning devices, to achieve acceptable IAQ. Utilizing the IAQP can reduce dependence on outdoor air, thereby decreasing HVAC system loads and enhancing energy efficiency.

4. Overview of ASHRAE 241

ASHRAE Standard 241, "Control of Infectious Aerosols," builds upon ASHRAE 62.1 by introducing targeted strategies to mitigate the spread of airborne infectious particles in indoor spaces. This standard is essential for facility managers, building owners, and engineers seeking to proactively reduce infection risks and create safer environments.

Key Components

- **Building Readiness Plan (BRP):** Requires the development of a customized plan tailored to each building's design to prepare for emergencies, such as infectious disease outbreaks. The plan provides guidelines for HVAC system adjustments, maintenance, and upgrades, including the integration of in-room air cleaning systems.

- **Infection Risk Management Mode (IRMM):** A dedicated operational mode activated during periods of elevated infectious risk, as determined by the Authority Having Jurisdiction (AHJ) or building management. IRMM operates in addition to—not instead of—baseline ASHRAE 62.1 ventilation requirements. The standard does not specify automatic activation based on individual indoor air quality indicators; activation is typically driven by public-health guidance, seasonal risk periods, or organizational policy as documented in the Building Readiness Plan.

- **Risk Assessment and Zone Prioritization:** Emphasizes the importance of evaluating building areas based on occupancy density, activity levels, and potential exposure to airborne infectious aerosols. High-priority zones, such as healthcare facilities and classrooms, require enhanced ventilation and filtration strategies.

- **Equivalent Clean Airflow Rate (ECAi):** Defines the volume of pathogen-free air delivered to occupied spaces, which is essential for infection risk reduction. Achieving the required ECAi involves a combination of ventilation, advanced filtration, and air cleaning systems.

- **Verification, Monitoring, and Maintenance:** Highlights the need for ongoing performance verification and real-time monitoring of IAQ parameters, such as CO_2 and particulate matter (PM2.5). Regular system maintenance ensures continued compliance and optimal performance.

- Energy Efficiency Considerations: Recognizes the importance of balancing infection control measures with energy efficiency. High-efficiency filtration systems and optimized air cleaning strategies are recommended to achieve both health and sustainability goals.

5. Key Differences Between ASHRAE 62.1 and ASHRAE 241

The fundamental shift from 62.1 to 241 represents a change in focus: from area-based ventilation for comfort to person-based clean airflow for infection control.

Comparison Summary

	ASHRAE 62.1	ASHRAE 241
Primary Focus	Outdoor air ventilation rates	Filtration, air cleaning, and disinfection
Key Metric	Outdoor Air CFM (cubic feet per minute)	Equivalent Clean Airflow (ECAi)
Approach	Area-based calculations	Individual CFM requirements per person
Operation	Continuous standard mode	Activated via BRP during health alerts
Air Cleaning Contribution	Limited consideration	Full credit for validated devices

The Critical Insight

Under typical conditions, buildings adhere to ASHRAE 62.1 using mostly outdoor air to keep occupants comfortable with acceptable air quality. The focus is on the area of the space.

When ASHRAE 241 IRMM mode is activated, requirements become less about the area of the space and more about individual CFM requirements per person. The standard is agnostic to how clean air is delivered—HVAC, air cleaning devices, or a combination—as long as the ECAi target is achieved.

6. The Requirement Gap: 62.1 vs. 241

ASHRAE 241 significantly increases clean airflow requirements compared to 62.1. The equivalent clean airflow requirement for a space can be met not only by outdoor air but also by filtered recirculated air and air disinfected by various technologies—allowing flexibility for compliance using combinations that optimize cost and energy use.

Verified ASHRAE Requirements

The following table shows requirements from ASHRAE 62.1 Table 6-1 and ASHRAE 241 Table 5-1:

Space Type	ASHRAE 62.1 (Outdoor Air)	ASHRAE 241 (ECAi Target)	Clean Air Uplift Factor
Office	5 CFM/person	30 CFM/person	6X
Classroom	10 CFM/person	40 CFM/person (20 L/s)	4X
Retail	7.5 CFM/person	42 CFM/person (20 L/s)	6X

Note: ASHRAE 241 Table 5-1 expresses rates in liters per second (L/s). Conversion: 1 L/s = 2.119 CFM.

Practical Example: Office Space

Consider a 5,000 square foot office with 25 occupants:

ASHRAE 62.1 Requirement:

- Per-person rate: 5 CFM × 25 people = 125 CFM (people component)
- Per-area rate: 0.06 CFM/sq ft × 5,000 sq ft = 300 CFM (area component)
- Total outdoor air: 425 CFM

ASHRAE 241 Target (During IRMM):

- ECAi requirement: 30 CFM × 25 people = 750 CFM
- Gap: Approximately 325 CFM of additional equivalent clean airflow

Practical Example: K-12 Classroom

Consider a typical 900-square-foot classroom with 20 students:

ASHRAE 62.1 Requirement:

- Per-person rate: 10 CFM × 20 people = 200 CFM (people component)
- Per-area rate: 0.12 CFM/sq ft × 900 sq ft = 108 CFM (area component)
- Total outdoor air: 308 CFM

ASHRAE 241 Target (During IRMM):

- ECAi requirement: 40 CFM × 20 people = 800 CFM
- Gap: Approximately 492 CFM of additional equivalent clean airflow

7. How Fellowes Can Help You Achieve the Required ECAi

The Equivalent Clean Airflow Calculator (ECAC) is a powerful tool for estimating the **Equivalent Clean Airflow Rate (ECAi)** needed in a given space. It enables facility managers, building owners, and engineers to evaluate existing ventilation, filtration, and air-cleaning strategies and to identify any additional measures needed to achieve the **target ECAi specified in ASHRAE 241** during Infection Risk Management Mode (IRMM). ASHRAE 241 allows Equivalent Clean Air credit from **outdoor air ventilation, filtered recirculated air, and air-cleaning devices**, providing flexibility in how required ECAi levels are achieved.

Fellowes Array air cleaners play a critical role in achieving these targets by delivering clean, pathogen-free air to occupied spaces.

Using the ECAC

To calculate the ECAi for your building:

1. **Collect Inputs:** Use the Clean Air Delivery Rate (CADR) values for each Fellowes Array air cleaner in use. These values indicate the volume of air (measured in cubic feet per minute, or CFM) that the cleaner effectively cleans.

2. **Input Data:** Enter the CADR values and other required parameters specific to your space, such as room size, occupancy level, and baseline ventilation rates.

3. **Evaluate Results:** The ECAC will determine whether your space meets the ECAi target. If gaps are identified, Fellowes air cleaners can be deployed strategically to bridge them.

Tested and Validated

All Fellowes Array commercial air cleaners have been rigorously tested and validated to meet ASHRAE 241 requirements (refer to Section 7 of the standard). Devices have been evaluated against industry benchmarks, including AHAM AC-1 and AHAM AC-5, based on their airflow and filtration performance. The CADR values derived from these tests can be directly input into the ASHRAE 241 calculator, enabling users to confidently determine compliance and optimize their indoor air quality strategies.

8. Fellowes Array Product Compliance

The following products meet ASHRAE 241 requirements and have been tested per the protocols specified in Section 7 of the standard.

Array Air Quality Management System

Model	CADR/ECAI Contribution (CFM)	Test Protocol	Report Number	Meets ASHRAE 241
Fellowes Array Recess AR1	305	AC-1	105329533CRT-002	Yes
Fellowes Array Recess AR2	567	AC-5	106019651COL-001	Yes
Fellowes Array Ceiling AC2	795	AC-5	106019638COL-001	Yes
Fellowes Array Stand & Wall AS1/AW1	194	AC-1	105355741CRT-002	Yes
Fellowes Array Stand & Wall AS2/AW2	519	AC-5	106019632COL-001	Yes

Note: ECAi Contribution values pending final calculation per ASHRAE 241 methodology. CADR values validated per AHAM AC-1 and AC-5 test protocols.

9. VACS Calculation Methodology

ASHRAE 241 specifies how to calculate the Ventilation Air Cleaning System (VACS) contribution from in-room air cleaners.

For Devices Tested per ANSI/AHAM AC-1

The VACS calculation uses Clean Air Delivery Rate (CADR) values weighted by particle type:

VACS = (CADRs × 0.30) + (CADRd × 0.30) + (CADRp × 0.40)

Where:

- CADRs = Clean Air Delivery Rate for tobacco smoke (30% weight)
- CADRd = Clean Air Delivery Rate for dust (30% weight)
- CADRp = Clean Air Delivery Rate for pollen (40% weight)

Important (Section 7.3.2.1): VACS equals zero if CADRs (smoke) is zero or not reported. This ensures devices are validated for the smallest particle sizes relevant to infectious aerosols.

For Devices Tested per ANSI/AHAM AC-5

For larger commercial devices tested under AC-5, the full m-CADAR (Microbial Clean Air Delivery Rate)value can be used directly as the VACS contribution.

10. Implementation Example: Classroom Application

Scenario

A school district needs to achieve ASHRAE 241 compliance for a 900 square foot classroom with 20 students during flu season (IRMM activated).

Requirements Analysis

ASHRAE 62.1 Baseline:

- Outdoor air requirement: ~308 CFM (per-person + per-area)
- Current HVAC delivers baseline requirement

ASHRAE 241 Target (IRMM):

- Required ECAi: 800 CFM (40 CFM × 20 students)
- Current capacity: ~308 CFM outdoor air
- Gap: ~492 CFM additional equivalent clean airflow needed Solution Options

Solution Options

Option A: HVAC-Only Approach

Approach:

- Increase outdoor air capacity by 492+ CFM
- Ductwork modifications and/or AHU upgrade required

Estimated Costs:

- Capital: $10,000 - $50,000+ (varies by building age and system)
- Installation: Contractor required, permits, potential downtime
- Annual energy: ~6% increase in HVAC energy consumption for conditioning additional outdoor air (NYSERDA estimate)

Timeline: Weeks to months

Option B: Supplemental Air Cleaning

Approach:

- Deploy two Array AR1 units (308 CFM each = 616 CFM CADR)
- Combined ECAi: 308 CFM (HVAC) + 616 CFM (air cleaners) = 924 CFM ✓

Estimated Costs:

- Equipment: ~$8,250 (2 units at list price)
- Installation: ~$500 per unit for electrical run and ceiling mounting (typically completed same day)
- Annual energy: ~105 kWh

Timeline: Same day

Option C: Combined Approach

Approach:

- Upgrade HVAC filters to MERV 13 (gains filtration credit on recirculated air)
- Deploy one Array AR2 unit (567.6 CFM CADR)
- Combined approach exceeds requirement with redundancy

Estimated Costs:

- Equipment: ~$5,750 (1 AR2 unit) + MERV 13 filter upgrade
- Installation: ~$500 for electrical run and ceiling mounting (typically completed same day)
- Annual energy: ~96 kWh (AR2) + minimal increase from filter upgrade

Timeline: Same day for Array unit; filter swap during routine maintenance

Benefits:

- Provides flexibility for varying occupancy levels
- Built-in redundancy exceeds minimum requirement
- Leverages existing HVAC investment
- Significantly lower implementation cost

11. Documentation Requirements

ASHRAE 241 requires specific documentation for air cleaning devices used to meet ECAi requirements. Fellowes provides:

- Third-party test reports per AHAM AC-1 and/or AC-5 protocols
- CADR values for ECAi calculator input
- Installation guidelines and placement recommendations
- Maintenance schedules and filter replacement intervals
- Systems, tools, and guidance for IRMM activation

Compliance documentation for building records and inspections This documentation supports the Building Readiness Plan and demonstrates compliance during inspections and audits.

12. Conclusion

Achieving optimal indoor air quality is not just a regulatory requirement; it's a critical component of creating healthier, safer, and more productive environments for building occupants. By leveraging Fellowes Array air cleaners alongside HVAC systems, facility managers, building owners, and engineers can meet the requirements of ASHRAE Standards 62.1 and 241 while enhancing occupant well-being. The Fellowes Array Air Quality Management System plays a critical role in complementing HVAC systems by:

- **Enhancing air quality** when and where it is needed most
- **Meeting ASHRAE 241 requirements** for Equivalent Clean Airflow
- **Providing validated CADR values** for ECAi calculator input
- **Offering flexibility and scalability** for rapid deployment
- **Reducing HVAC burden** and associated energy costs
- **Supporting documentation requirements** for compliance verification

The tools and technologies offered by Fellowes, along with the ASHRAE Equivalent Clean Airflow Calculator (ECAC), simplify compliance and provide a clear path to implementing effective air cleaning strategies tailored to your specific needs.

References

ASHRAE. (2025). ANSI/ASHRAE Standard 62.1-2025: Ventilation and Acceptable Indoor Air Quality.

ASHRAE. (2023). ANSI/ASHRAE Standard 241-2023: Control of Infectious Aerosols.

Association of Home Appliance Manufacturers. ANSI/AHAM AC-1-2020: Method for Measuring Performance of Portable Household Electric Room Air Cleaners.

Association of Home Appliance Manufacturers. ANSI/AHAM AC-5-2023: Method for Measuring Performance of Air Cleaners: Particle Size.

If you have questions about how Fellowes air cleaners can support your building's air quality goals or if you'd like assistance in achieving compliance with ASHRAE 62.1 and 241, contact your Fellowes representative or reach out to support at AQMSupport@Fellowes.com. to explore customized solutions for your space.