New ASHRAE Standard 241

ASHRAE has released a new standard to reduce the risk of airborne disease.

Here's what you need to know.

By David Bodenschatz

ASHRAE has released Standard 241, which establishes minimum requirements to reduce the risk of transmission of infectious aerosols like COVID-19 and influenza in buildings.

The standard defines the amount of clean airflow (or equivalent) necessary to substantially reduce the risk of airborne disease transmission during times of elevated risk. It is written as a standard of care, not currently adopted by any jurisdictions as a code. At this time, owners decide when it will be enforced.

Standard 241 does not usurp requirements to meet current ventilation standards such as ASHRAE Standard 62.1 Ventilation for Acceptable Indoor Air Quality; Standard 170 Ventilation of Health Care Facilities; or the building code ventilation requirements (e.g., International Mechanical Code Chapter 4 or California Mechanical Code Chapter 4). Designing the building to meet these codes and standards is a prerequisite to 241.

Standard 241 is not intended for day-to-day operation of HVAC equipment. Instead, it creates a building readiness plan (BRP) should another infectious pandemic occur and the building needs to operate in an infection risk management mode (IRMM).

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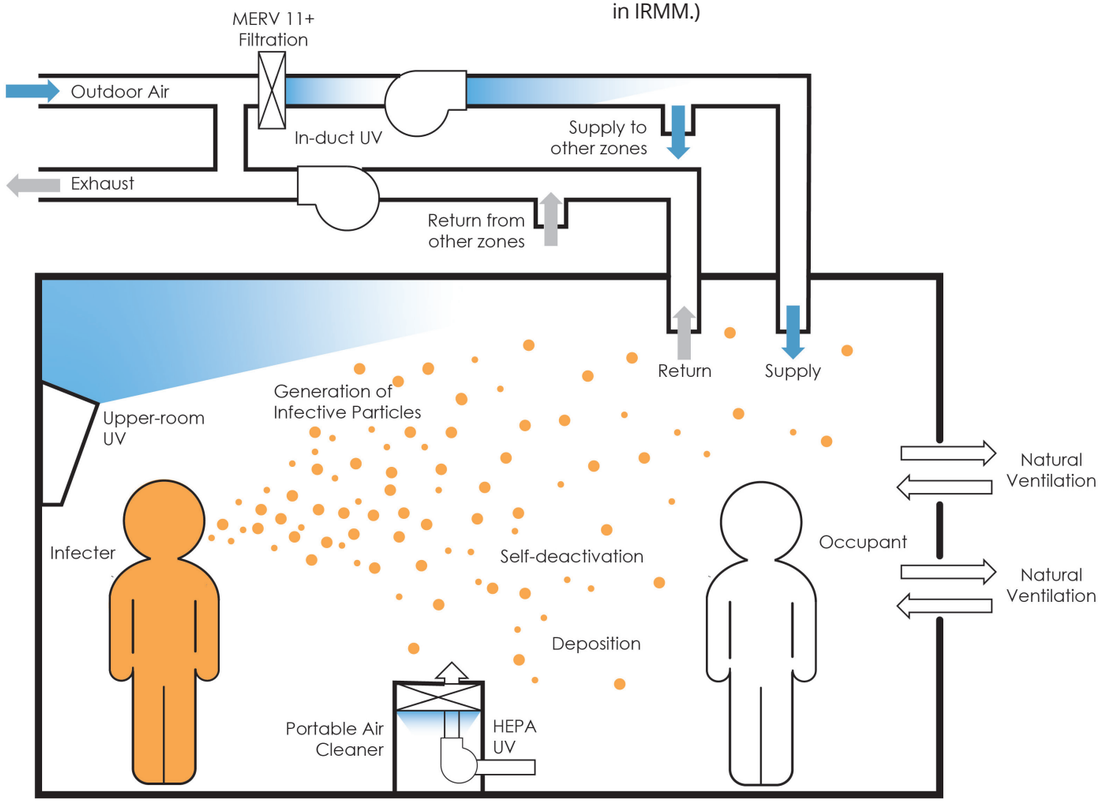
Alternative mode of operation

Standard 241 does not change the basis of building designs; it provides an alternative mode of operation that improves airflow so you can reduce the risk of airborne disease transmissions.

The owner decides when to enact the plan's IRMM and decides the IRMM occupancy density versus the design clean airflow rate. This gives owners the flexibility to improve specific spaces or reduce the occupancy of a space or a combination thereof. During the COVID-19 pandemic, one of the best ways to reduce transmission was allowing staff to work remotely, rather than in closely spaced cubicles. A lecture hall may typically have seats spaced every 2 feet on center, but during the pandemic, a 6-foot separation was practiced. Such a spacing would have reduced the IRMM occupancy by 60%. Standard 241 defines long-range transmission as an infector who is not near (+/- 3 feet) a susceptible occupant.

The goal of Standard 241 is to ensure an adequate volume (ft/min; CFM) of clean, filtered, and treated air is circulated through the space around occupants. (VECAi = minimum equivalent clean airflow rate required in the breathing zone to mitigate long-range transmission risk in IRMM.)



The goal of Standard 241 is to ensure adequate volume of clean, filtered, and treated air is circulated through a space.

In the future, viral particles may be able to travel within the air handling system.

Standard 241 considers the following as equivalent clean air:

- Outdoor air (mechanical and natural ventilation)
- Air passed through MERV 11 or higher filters
- Air passed through ultraviolet lights
- Standard 241 also allows for other emerging technologies if they are third-party tested. In Appendix A —Determining Air Cleaning System Effectiveness and Safety, Standard 241 sets up a testing procedure for emerging or future air cleaning technology effectiveness and safety. During the COVID-19 pandemic, new technologies emerged with only system manufacturer testing. The standard now requires third-party, independent testing.

Research during the COVID-19 pandemic[1] indicated the virus did not circulate through HVAC systems.

Remnants of the virus (RNA) were found in the units, but not live, active viruses. Typical air handling unit designs lacked the appropriate capture velocity to overcome the effects of gravity and pull the active COVID-19 viruses into the HVAC system.

But the presence of viral RNA in the air handlers raises the possibility that in the future, other, lighter, longer-transmission viral particles could enter from room return air and travel within the air handling system into supply air ducts. This standard's intent is to increase the likelihood of air being cleaned by passing through filters or UV lights.

[1]SARS-CoV-2 in Healthcare HVAC systems, June 2020; Horve, Dietz, Fretz, Constant, Wilkes, Townes, Martindale, Messer, Van Den Wymelenberg; June 2020

Options for compliance

Owners and designers have options to comply with Standard 241. They may increase outside air and install these components during construction, or they could buy and store portable equipment for use during a pandemic:

- Outside air: The building may be designed to code minimum ventilation rates with an option to increase the outside air during IRMM. Outside air is a direct input to calculating the VECAi.

- Filtration: MERV-11 or higher filters are required for filtered air to be counted. The higher the MERV rating, the higher the effectiveness in calculating the VECAi. Central station air handling units may be designed to accommodate MERV-11 filters or higher but could use lower-rated filters during normal mode. Owners may stockpile MERV-11 filters to be ready for an IRMM.

- Local room fan-filter units: Owners can buy several that may be moved into the dedicated IRMM spaces.

- Ultraviolet lights: UV lights may be installed inside the air handling units or within the space. Not all UVGI (ultraviolet germicidal irradiation) lights in air handling systems are intended for full sterilization. The most common UVGI intensity in an air handling unit is designed and sized only for coil/drain pan sterilization to reduce microbial growth. This intensity of UVGI light is not intended to—nor can it be modified to—sterilize moving air. Permanently installed UVGI in the room at the ceiling level should be guarded to protect the occupants from direct exposure to the UVC (ultraviolet-C) light. Room-level air currents that pass air through the irradiated area to the protected area can be counted as VECAi. Some manufacturers build fan filter units that include UV lights.

Standard 241 shouldn't change how buildings are designed. It will help owners develop a plan to reduce the risk of disease transmission while operating in IRMM.

Intensity values

In general, the following intensity values were provided by one manufacturer for UVGI[2] :

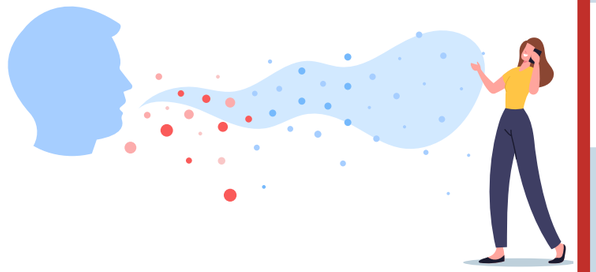
- 250 µW/cm^2 is normally used for maintaining coil cleaning
- 250 µW/cm^2 (URV-8[3]) can provide 25% to 30% average pathogen reduction per pass[4]

[2]Information provided by Lumalier Evergreen UV
[3]URV ratings are used to determine UV intensity for pathogen kill rates
[4]Included in the operating parameters are a recommended minimum of 0.25 seconds of UV exposure, an air velocity within the range of 500 fpm+/-100 fpm, and a recommended rating of URV 10 or higher - Dr. Wladyslaw Kowalski, IUVA Air Treatment Symposium, 2007

IS THERE A DIFFERENCE BETWEEN ASHRAE GUIDELINES AND STANDARDS?

ASHRAE guidelines offer recommendations, best practices, and insights for building design-related topics.

ASHRAE standards are official documents that provide minimum requirements, specifications, and/or design procedures for various building systems. Standards are written in codified language so they can be adopted by jurisdictions and enforced as code.



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