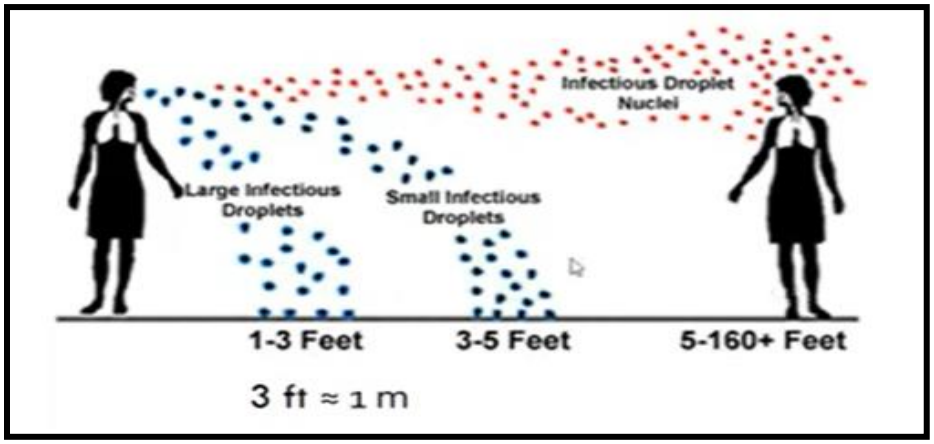
Vetting Indoor IAQ Technologies In-Light of COVID-19



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Time to Move Forward

The time has arrived for the public to begin reoccupying buildings all across the country, yet there still remains great concern about the possibility of transmission (through the indoor air) of various pathogens (especially SARS-CoV-2) among individuals in both private and public sectors. HVAC design teams involved in providing solutions are advised to follow (as a minimum) the latest published codes and standards. They are also being told to look beyond the minimum requirements, and to use techniques covered in various guidelines and publications as well as recognized good-or-best practices, to be better prepared to control the dissemination of infectious aerosols within the built environment.

The **American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Position Document on Infectious Aerosols** outlines HVAC-system recommendations for various buildings and facilities which are aimed at reducing occupant exposure to airborne disease. Practices addressed include ventilation-related strategies comprised of dilution, airflow patterns, pressurization,

temperature, humidity, filtration, and other approaches. Included may be Indoor Air Quality (IAQ) technologies which can be "bundled" with proper ventilation and filtration to help produce better results. These devices may include (but are not limited to) Ultraviolet Germicidal Irradiation (UVGI), Needlepoint Bipolar Ionization (NPBI), Bipolar Air Ion Generators (BPI), Photocatalytic Oxidation (PCO), Liquid Desiccant Dehumidification (LDD), Polarized Media Filters, Electrostatic Precipitators, Negative Ion Generators, Electric Barrier Discharge Ion Tubes, and the list goes on and on.

Vetting Technology

It's important to understand what the **U.S. Environmental Protection Agency** (EPA), along with **ASHRAE** and others have to say about these ancillary IAQ devices and the impact (good or bad) they can have on indoor environments. Regardless of make-or-model, all filtration and air-cleaning technologies should be accompanied by data documenting their performance regarding removal of contaminants and the production of any ozone. This data should be based on established industry test standards, and if not available should then consist of scientifically controlled third-party evaluation and documentation.

Proof of efficacy with regard to the specific issue or pathogen of concern should be documented by a credible third-part testing agency, with a written report of exactly how the testing was performed, along with detailed results. In advertising documents and brochures this information may appear as displayed below, but always insist on seeing the full independent test data report(s).

3rd Party Testing Summary

Pathogen	Time in Chamber	Kill Rate	Test Agency
Tuberculosis	60 minutes	69.09%	EMSL
Clostridium Difficile	30 minutes	86.87%	EMSL
Norovirus	30 minutes	93.50%	ATS Labs
MRSA	30 minutes	96.24%	EMSL
Staphylococcus	30 minutes	96.24%	EMSL
Mold Spores	24 hours	99.50%	GCA
E.coli	15 minutes	99.68%	EMSL
Legionella	30 minutes	99.71%	EMSL

Airborne Mold Spores Reduced by 95%

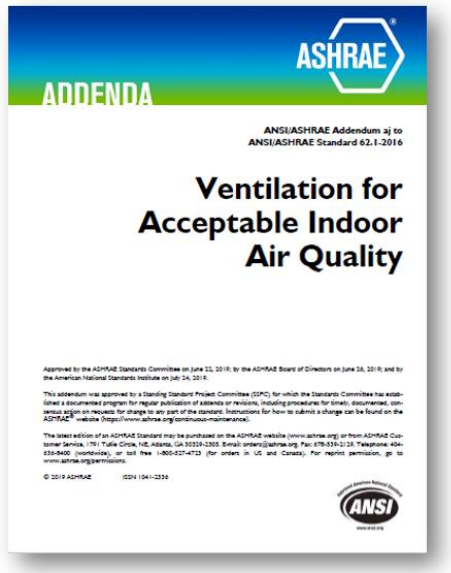
EMSL

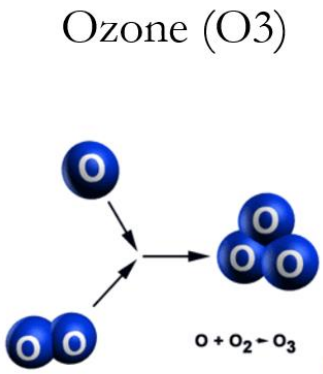
ATS LABS
EXCELLENCE IN ANTIMICROBIAL TESTING
Owned by Accuratus Lab Services

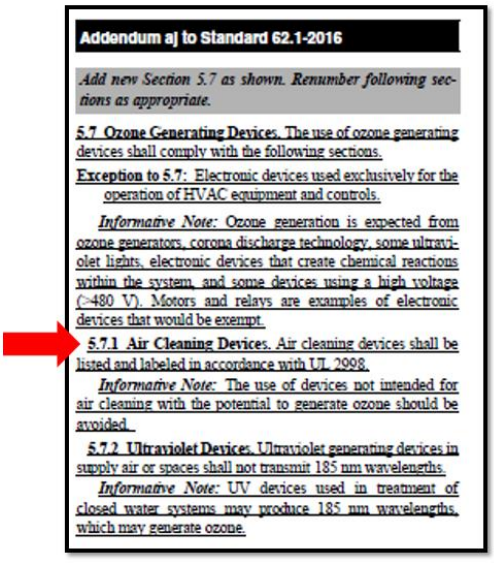
Compliance Requirements

A very important consideration of any electrically-powered IAQ devices is that of ozone production. The **EPA** says that when inhaled, ozone can damage the lungs. Relatively low amounts can cause chest pain, coughing, shortness of breath and throat irritation. Ozone may also worsen chronic respiratory diseases such as asthma and compromise the ability of the body to fight respiratory infections. Manufacturers and vendors of ozone devices often use misleading terms to describe ozone. Terms such as "energized-oxygen" or "pure-air" suggest that ozone is a healthy kind of oxygen. **Ozone is a toxic gas** with vastly different chemical and toxicological properties from oxygen. Several federal agencies have established health standards or recommendations to limit human exposure to ozone.

ASHRAE has issued guidance for the allowable limits of ozone production deemed appropriate for HVAC systems serving occupants within the built environment. **ASHRAE Standard 62.1 Ventilation for Acceptable Indoor Air Quality** details these restrictions with stringent requirements stating that "air cleaning devices shall be labeled and listed in accordance with **UL 2998**.







Addendum aj to Standard 62.1-2016

Add new Section 5.7 as shown. Renumber following sections as appropriate.

5.7 Ozone Generating Devices. The use of ozone generating devices shall comply with the following sections.

Exception to 5.7: Electronic devices used exclusively for the operation of HVAC equipment and controls.

Informative Note: Ozone generation is expected from ozone generators, corona discharge technology, some ultraviolet lights, electronic devices that create chemical reactions within the system, and some devices using a high voltage (>480 V). Motors and relays are examples of electronic devices that would be exempt.

5.7.1 Air Cleaning Devices. Air cleaning devices shall be listed and labeled in accordance with UL 2998.

Informative Note: The use of devices not intended for air cleaning with the potential to generate ozone should be avoided.

5.7.2 Ultraviolet Devices. Ultraviolet generating devices in supply air or spaces shall not transmit 185 nm wavelengths.

Informative Note: UV devices used in treatment of closed water systems may produce 185 nm wavelengths, which may generate ozone.

Underwriters Laboratories (UL) in Northbrook, IL, recently took on the task of creating the validation for zero ozone air cleaning devices. It requires that qualifying zero ozone emission products must demonstrate they emit less than the maximum

ozone concentration limit of **0.005 ppm (5 ppb)** which is below quantifiable levels for ozone testing. This is 10-fold less than permitted under test standard **UL 867**, which allows concentrations of 0.05 ppm (50 ppb). UL 2998 doesn't guarantee product performance, it only certifies the technology is safe to use in respect to ozone generation.

While there is no consensus on the safe level of ozone, **ASHRAE's Environmental Health Committee** (2011b) issued an emerging issue brief suggesting "safe ozone levels would be lower than 10 ppb" and that "the introduction of ozone to indoor spaces should be reduced to as low as reasonably achievable. In the **ASHRAE Position Document on Filtration and Air Cleaning** it's stated that "even though the ozone is an unintentional by-product of operation, it may represent a net negative impact on indoor air quality and thus should be used with caution. If possible, non-ozone-emitting alternatives should be used".

Manufactures of IAQ products which have been confirmed as producing zero ozone emissions will carry the **UL Validated Label**, and are assured as compliant. You can check this yourself by visiting the **UL Spot** website and entering the make and model of the device, if it's not listed be wary. It's the author's recommendation that caution should be applied and occupants notified when operating electrically powered indoor IAQ devices that do not meet these qualifications.

COVID-19 Recommendations

ASHRAE has recognized that the transmission of **SARS-CoV-2** through the air is sufficiently likely and that airborne exposure to the virus should be controlled. Changes to building operations, including the operation of heating, ventilating, and air-conditioning systems can reduce airborne exposure. So what about HVAC measures to specifically address concerns with the SARS-CoV-2 virus which caused the disease COVID-19?

Technologies that are proven to "kill" (disable, deactivate, disrupt) COVID-19 are not yet available with reliable testing to back-up this claim. Until now, the novel virus was not available for study. With the understanding that it can take more than a year to get a viral claim approved by regulatory agencies, the **EPA** has enacted a "hierarchy-based" policy. This means if a company's product has been found to be effective against harder-to-kill viruses, its "likely" to kill a virus like COVID-19. A product that is likely to provide the greatest protection to you from COVID-19 will have claims against at least one **non-enveloped virus** such as Norovirus, Feline Calicivirus, Poliovirus, Rhinovirus, or Reovirus. Once we have products available with evidence-based test results our options will be more clearly defined, but this may take considerable time.

It's always best to use products that have been qualified for the specific viral pathogen of concern. Until then, the **EPA** says that if you cannot obtain those products, then use products that are effective at killing Human Coronavirus because it's expected those products will also be effective against SARS-CoV-2.

References:

1. ASHRAE Position on Infectious Aerosols.
2. ASHRAE Position Document on Airborne Infectious Diseases.
3. ASHRAE Position Document on Filtration and Air Cleaning.
4. ANSI/ASHRAE Standard 62.1-2016 Addendum aj.
5. David N. Schurk, Whitepaper: The HVAC System's Role in Environmental Infection Control for Hospitals.
6. Center for Biocide Chemistries Answers Your Questions about COVID-19 by Sarah J. Scruggs | March 11, 2020.

Authors Bio

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