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Ventilation and Acceptable Indoor Air Quality

An Update on ANSI/ASHRAE Standard 62.1

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Another continuous maintenance cycle for ANSI/ASHRAE Standard 62.1 has concluded, and the keen observer will have already noticed one of the changes made in the 2022 edition of the standard. Despite the conditions created by the COVID-19 pandemic, the committee has continued to meet over the past two years, more often in web conferences than in person, to consider continuous maintenance proposals and interpretation requests and to discuss issues related to ventilation and indoor air quality. The addenda that have been adopted to the 2019 edition of that standard generally fall into three categories: clarifications, harmonization and improved procedures. Work was also begun on mandatory air density corrections, further development of humidity control requirements and addressing future extreme events, but this work was not completed in time for inclusion in the 2022 edition of the standard.

A New Name

One of the earliest changes to the standard this cycle was the change in the title from *Ventilation for Acceptable Indoor Air Quality* to *Ventilation and Acceptable Indoor Air Quality*. This may seem like a trivial change, but it recognizes that there are many factors that contribute to acceptable indoor air quality beyond ventilation and that the standard already includes many requirements not directly related to ventilation, such as requirements for system components (e.g., drain pans, louvers, filters, etc.), building envelopes and types of buildings (e.g., those with attached garages). Most importantly, by separating ventilation from acceptable indoor air quality, which occurred prior to the pandemic, the committee

showed humility in recognizing that even adherence to the procedures in the standard did not guarantee acceptable indoor air quality due to factors both recognized in the standard, such as unusual sources, and unpredictable factors such as the global pandemic that would emerge mere months after this change was approved.

A New Look

Speaking of unusual sources, readers of the 2022 edition of the standard will find an updated definition

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that seeks to clarify what an unusual source is and adds an informative note directing users to the informative appendix, which includes descriptions of potential contaminant sources considered by the committee for spaces listed under the ventilation rate procedure. Another clarification was changing the term “cooling towers” to “evaporative heat-rejection equipment” and providing a new definition of the same to indicate that requirements related to cooling towers apply to all devices that evaporate water from open loops to reject heat.

A change to the definition of recirculated air was made to clarify that the requirements also apply to devices that recirculate air within a space, such as chilled beams and fan coil units. Finally, a clarification was made to indicate the conditions under which leakage and carryover at energy recovery devices is to be determined and that any air transferred through energy recovery devices is not considered to be ventilation air.

Several requirements of the standard were made to harmonize the requirements with other ASHRAE standards. New to ANSI/ASHRAE Standard 62.1-2022 is the requirement that the designers include all documentation required for the owner to comply with ANSI/ASHRAE Standard 188-2018, *Legionellosis: Risk Management for Building Water Systems*. This requirement, and the aforementioned clarification related to evaporative heat-rejection equipment, builds on the existing requirements intended to reduce the risk of Legionellosis associated with HVAC systems.

Another change seeks to harmonize Standard 62.1 with ANSI/ASHRAE Standard 62.2 by removing dwelling units as a space under the Ventilation Rate Procedure (VRP). This harmonization also unified the air class of kitchen exhausts and applied the recirculation restriction on dwelling units to all sleeping rooms, including hotel rooms and dormitories. The last harmonization effort relocated the outpatient health-care occupancy spaces from the VRP to a normative appendix. This change may seem inconsequential to many, but Standard 62.1-2019 includes language which invokes ANSI/ASHRAE/ASHE Standard 170, *Ventilation of Health Care Facilities*, for spaces within its scope, and as of the 2021 edition of Standard 170 the outpatient health-care spaces appeared in both standards, creating the potential for confusion.

Due to the way model code authorities incorporate these standards, committee members representing the

International Code Council requested that the rates be included in Standard 62.1 for non-health-care occupancies (e.g., medical offices, schools), which is why the outpatient spaces were retained in a normative appendix for use when Standard 170 does not apply. The rates in the new normative appendix were also updated to be consistent with those in Standard 170.

A New Way

The most significant change that users of ANSI/ASHRAE 62.1-2022 will notice is that there has been a major revision to the Indoor Air Quality Procedure (IAQP). This change was begun as an addendum to the 2016 edition of the standard and has undergone four publication public reviews and response to over 200 comments from more than 60 unique commenters. The basic principles of the previous IAQP are unchanged; the designer must still use mass balance analyses to determine the concentration of contaminants and combinations of contaminants, and the indoor air quality conditions in the building must still be evaluated subjectively. These changes have been clarified with new language, a formula presentation of combinations of contaminants, and a list and concentration limits of design compounds and PM_{2.5} that must be not be exceeded has been added, as have specific combinations of design compounds.

Notably absent is the inclusion of carbon dioxide; for more information on why this is so, the reader is directed to the ASHRAE Position Document on Indoor Carbon Dioxide (<https://tinyurl.com/bdcvh4yk>). It is important to note that the design compounds are not exhaustive and that the designer is obligated to include additional contaminants based on the local air quality assessment and those contaminants that the designer deems relevant and for which a cognizant authority has established a design limit, which may include carbon dioxide in some countries.

This new IAQP has also cleared the way for the publication of a companion addendum related specifically to exhaust systems, which was approved previously but not published until the new IAQP procedure was available. The new addendum includes references to ANSI/ASHRAE Standard 154 for kitchen exhaust, exclusions for open parking garages based on model building codes and additional requirements related to combustion sources and laboratories.

The other major addition to the IAQP for both supply air and exhaust air systems is the inclusion of a qualitative evaluation that requires post construction air quality testing to determine whether the design contaminants and combinations of contaminants are controlled to the design limits. The required test is to be performed over an eight-hour period with the ventilation system operating normally. The standard also requires that the contaminant sensors be located in the breathing zone and that they be capable of detecting concentrations less than the associated design limit. The required accuracy of certain sensors is also specified, and these requirements are expected to develop further in the future.

A New Cycle

As to the future, even though the 2022 edition of Standard 62.1 has been finalized for publication, the committee approved four more addenda to the 2019 edition for publication public review and one addendum for advisory public review during ASHRAE's Annual Conference in June. The topics covered by these addenda include ozone generating devices, humidity control and ventilation of health-care spaces. Furthermore, the committee is responding to comments on a proposed addendum to mandate density corrections for elevation and requests from the United States federal government and the ASHRAE Epidemic Task Force to address lessons learned from the current global pandemic.

Taking a closer look at some of the proposed addenda reveals some of the complicated topics before the committee. Addendum *e* specifies requirements for the design of direct evaporative cooling systems and includes a relative humidity limit of 65%, which has been contrasted with the limit for mechanical and indirect evaporative cooling systems that was changed in 2016 to a dew-point limit of 60°F (16°C). The approved advisory public review that was concluded in early September sought input on revisions that would include a relative humidity limit for mechanical and indirect evaporative cooling systems, which attempts to address comments about the availability of dew-point controllers on commercial HVAC packaged systems and exclusion of climates at low risk of the deleterious effects that the dew-point limit is intended to control. To understand the purpose of the original change and the

impacts of the proposed changes, the reader is invited to review the ASHRAE Position Document on Limiting Indoor Mold and Dampness in Buildings (<https://tinyurl.com/mrfkxc4y>).

The reader may be forgiven for having missed the review period earlier this year on Addendum *j*, which addresses density corrections. The committee noted that this addendum would increase outdoor airflow rates by 10% or more in thirty-eight states and by more than 25% in sixteen states, yet the draft received only two comments. One questioned the significant figures of the conversion between IP and SI units, and the second came from one of the negative votes on the committee outlining the large market impact and the lack of evidence indicating that current practice results in inadequate ventilation. For a topic as controversial as this one, the lack of public input was admittedly distressing, particularly as this change would have large impacts on energy expenditures and design practice. If the committee issues an additional public review to address the comments, we hope to receive more input, particularly from those members regularly designing at higher altitudes.

Although no addenda have yet to be drafted incorporating the work of the Epidemic Task Force, there have already been robust discussions about whether or not minimum filtration requirements should be increased permanently, and some advocacy for permanently increasing ventilation rates. Others on the committee have cautioned against permanent changes in response to temporary conditions, and some are advocating a middle ground that mandates design for higher filtration and ventilation requirements while maintaining the status quo for regular operations. Other ideas that have been discussed include increased emphasis on air distribution and air cleaning. The reader is reminded to regularly check for proposed addenda at <https://osr.ashrae.org/> to help the committee with developing the standard, or if they are so inclined, consider attending our next meeting in Atlanta and join us in this important work.

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