

ASHRAE Standard 62.2: What is it, what's new, and who's using it.

Steven J. Emmerich

Engineering Laboratory
National Institute of Standards and Technology
Gaithersburg, MD 20899 USA

Introduction

Readers of the November 2010 IAQ Applications column by Bud Offermann learned about a large, residential IAQ study that highlighted the importance of mechanical ventilation in U.S. homes. ASHRAE Standard 62.2-2010 Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings is the only national consensus standard for residential ventilation and indoor air quality (IAQ) in the United States. However, it is by no means the only document that determines ventilation and IAQ practices in U.S. homes. This column provides an update on Standard 62.2 including a summary of some recent changes and a discussion of future directions. It also discusses the use of Standard 62.2 by building codes and in various “green” building programs, as well as other documents influencing residential ventilation and IAQ.

Background

Standard 62.2 was first published in 2003 as the first national ventilation and IAQ standard developed specifically for low-rise residential buildings. It has been maintained since then using ANSI and ASHRAE continuous maintenance procedures, with the publication of a new edition every 3 years. The 2010 edition incorporates 20 addenda to the 2007 version. When the standard was republished in 2004 and 2007, relatively few changes were made to the 2003 version. However, experience has been gained in the application of the standard due to its adoption by various building codes and use in numerous building programs. As such, many clarifications and improvements were incorporated into the 2010 version.

Standard 62.2 contains three primary sets of requirements: whole-building ventilation, local exhaust, and source control. Whole-building ventilation dilutes unavoidable contaminant emissions from people, materials, and activities. Local exhaust removes contaminants from kitchens and bathrooms before they spread to the rest of the house. Other source control measures are included to deal with unavoidable contaminants in homes. The standard also contains secondary requirements that support the main objectives of the standard such as sound and flow ratings for fans. Standard 62.2 does not contain specific pollutant concentration limits or some specific potential high-polluting events.

Information on residential ventilation and IAQ beyond the minimum requirements contained in the standard can be found in the companion guideline that was also developed by the SSPC 62.2 committee. ASHRAE Guideline 24-2008 provides explanatory and educational material not appropriate for a code-intended standard and addresses IAQ and ventilation issues where consensus could not be achieved for inclusion in the standard.

Recent Changes

A frequent question, particularly within the weatherization community, is whether it's still acceptable to use ASHRAE Standard 62-1989. That standard, which included the best available residential ventilation requirements two decades ago, has been superseded and its use is no longer appropriate. ASHRAE Standard 62.2-2010 is the only national consensus standard on residential ventilation rates. One of the most significant changes to 62.2 since its initial publication is the recent addition of an appendix addressing the application of the standard to existing buildings. This appendix allows some optional pathways for previously occupied buildings, which are intended to overcome barriers to application of the standard in existing buildings and makes it easier for weatherization programs to use 62.2-2010 as a replacement for 62-1989.

Future (possible) Changes

The discussion below reflects the opinions of the author. Actual changes to the standard will result from committee debate and public review.

- **CO alarms**
Elevated CO is the most common residential IAQ problem that can be an immediate threat to health. Fortunately, cheap and effective alarms exist that can protect occupants from this potentially deadly pollutant. Proposed Addendum 1 to 62.2 would require CO alarms in all residences.
- **Multi-family housing requirements**
While low-rise multifamily housing is within the scope of 62.2, the standard contains very few requirements that address the unique challenges posed by these residences. One major concern is that airflow between units in apartment buildings can have a significant impact on IAQ (CEE 2004), which could be addressed with an intercompartamental airtightness requirement. Other issues to be considered include the appropriateness of the default infiltration credit and the potential impact of common parking garages.
- **Performance-based alternatives**
The committee is in the early stages of proposals to include performance-based alternative paths, which engineers will be able to use to develop innovative solutions and apply new technologies to improve both IAQ and energy efficiency. One approach would allow any whole-house ventilation system to be designed and installed if it could be demonstrated to provide equivalent IAQ to a specified target total ventilation rate. Such an approach might allow a user of the standard to employ a multizone IAQ model in the design process (Townsend et al. 2009). Another possibility would allow the lowering of the mechanical ventilation rate if better source control or other measures are used.
- **Differences in ventilation system designs**
Mechanical ventilation systems impact a dwelling's IAQ differently depending on the system design, such as whether they have balanced exhaust and supply flows and the means used to distribute ventilation air. Proposed Addendum s includes modifications to the required ventilation rate to account for these differences.
- **Unvented combustion space heaters**
Standard 62.2 does not address unvented combustion space heaters, but the language of this exception in the standard's scope is confusing. If these appliances have no negative impact on IAQ, no exception is needed; if they do have a potential impact, they should be included in the scope and the committee should develop requirements needed to ensure acceptable IAQ in dwellings containing them. Recent research provides information to assist in determining whether and what requirements are warranted (Francisco et al. 2010).
- **Measurement requirements for flow verification**
Providing the required ventilation in practice is the key to achieving the objective of the Standard, and 62.2 currently requires verification "using a flow hood, flow grid, or other airflow measuring device." Unfortunately, not all airflow measurement methods are reliable (Wray et al. 2002) and more specific measurement requirements should be considered.
- **Energy impacts**
Studies have shown that residential ventilation solutions meeting the requirements of 62.2 can have a wide range of energy impacts (Walker and Sherman 2008). Energy use related to ventilation and IAQ is not currently part of the scope of Standard 62.2, however, users care about energy impacts and ASHRAE Standard 90.2 has not addressed them. However these energy impacts are addressed, it is important that IAQ is never sacrificed for energy savings, but rather that IAQ objectives are attained in an energy efficient manner.

Use by Codes and Sustainable Residential Building Programs

ASHRAE Standard 62.2 is based on the latest results from both research and practice, and represents the consensus of a balanced committee of experts and has undergone extensive public review. The standard is written with the purpose of establishing minimum requirements for all low-rise residential

buildings. As such, it is appropriate for adoption or reference by building codes throughout the U.S. and as a foundation for the ventilation and IAQ requirements of sustainable residential building programs and standards.

Standard 62.2 has been proposed but not yet accepted for adoption by the International Residential Code (IRC). However, mechanical ventilation requirements for tight houses based on 62.2 may be included in the near future. It would be preferable to adopt 62.2 in entirety to take advantage of its flexibility (such as requirements for design of intermittent systems) and for critical supplementary requirements such as verification of whole house flow rates and sound ratings to ensure that homeowners gain the IAQ benefits of their ventilation systems.

While the IRC has not yet adopted Standard 62.2, the states of California and Maine have already done so. Other states are considering adoption, such as Washington and Minnesota, which have developed their own residential ventilation requirements.

There is also a proposal being considered to refer to 62.2 in the Manufactured Home Construction and Safety Standards promulgated by the U.S. Department of Housing and Urban Development (HUD). The MHCSS currently has a mechanical ventilation requirement but shortcomings have been identified (Lubliner et al. 1997) that could be addressed by requiring the full ventilation and IAQ requirements of 62.2.

Prior to adoption to the use of Standard 62.2 in state codes, the most widespread use of 62.2 has been as a requirement or option in voluntary sustainable residential building programs and standards. The U.S. EPA Indoor airPlus (a <http://www.epa.gov/indoorairplus/>) requires provision of ventilation meeting all the requirements of Standard 62.2 and compliance with other 62.2 requirements. Indoor airPlus is an optional IAQ label that is complementary to the popular Energy Star label but not required for all Energy Star home construction. However, Version 3 of Energy Star will require whole-building mechanical ventilation designed to meet 62.2-2007 beginning in 2012.

The National Association of Home Builders' National Green Building Standard (NAHB 2008) includes mechanical ventilation in accordance with Section 4 of Standard 62.2-2007. However, mechanical ventilation is only mandatory after a test proves a building is tight. If no test is done, then mechanical ventilation is merely a point-gaining option. This is a potentially risky approach as promoting tight envelope construction without controlled ventilation could lead to significant IAQ problems. In addition, many other features of 62.2 are treated as point-gaining options rather than minimum requirements.

A whole building ventilation system and local exhaust systems meeting Standard 62.2-2007 are required by the U.S. Green Building Council's LEED for Homes version 2008 (USGBC 2008) unless an approved passive ventilation system design is used. In addition, ventilation meeting 62.2 is required by LEED for Homes for mid-rise multifamily buildings despite the fact that these buildings are technically outside the scope of 62.2.

Most of these and other state and local green building programs have additional IAQ enhancing requirements and/or options, however, the basic requirements of 62.2 should be mandatory first. Requiring 62.2 in its entirety would enable these programs to take advantage of its flexibility, supplementary requirements, and continuous maintenance of requirements.

REFERENCES

- ASHRAE. 2008. *Guideline 24 Ventilation and Indoor Air Quality in Low-Rise Residential Buildings*.
CEE. 2004. *Reduction of Environmental Tobacco Smoke Transfer in Minnesota Multifamily Buildings Using Air Sealing and Ventilation Treatments*. Center for Energy and Environment Report TR04-1-MF.

- Francisco, PW, Gordon, JR and B Rose. 2010. "Measured concentrations of combustion gases from the use of unvented gas fireplaces." *Indoor Air* Vol 20-10.
- Lublinter, M., Stevens, DT and B. Davis. 1997. "Mechanical Ventilation in HUD-Code Manufactured Housing in the Pacific Northwest." *ASHRAE Transactions* Vol. 103-1.
- NAHB. 2008. *National Green Building Standard*. National Association of Home Builders.
- Townsend, A. Rudd, A. and J. Lstiburek. 2009. "A Method for Modifying Ventilation Airflow Rates to Achieve Equivalent Occupant Exposure." *ASHRAE Transactions* Vol. 115-2.
- USGBC. 2008. *LEED for Homes version 2008*. U.S. Green Building Council.
- Walker, IS and MH Sherman. 2008. "Energy Implications of Meeting ASHRAE Standard 62.2." *ASHRAE Transactions* Vol. 114-2.
- Wray, C., Walker, I. and M. Sherman. 2002. *Accuracy of Flow Hoods in Residential Applications*. LBNL-49697.