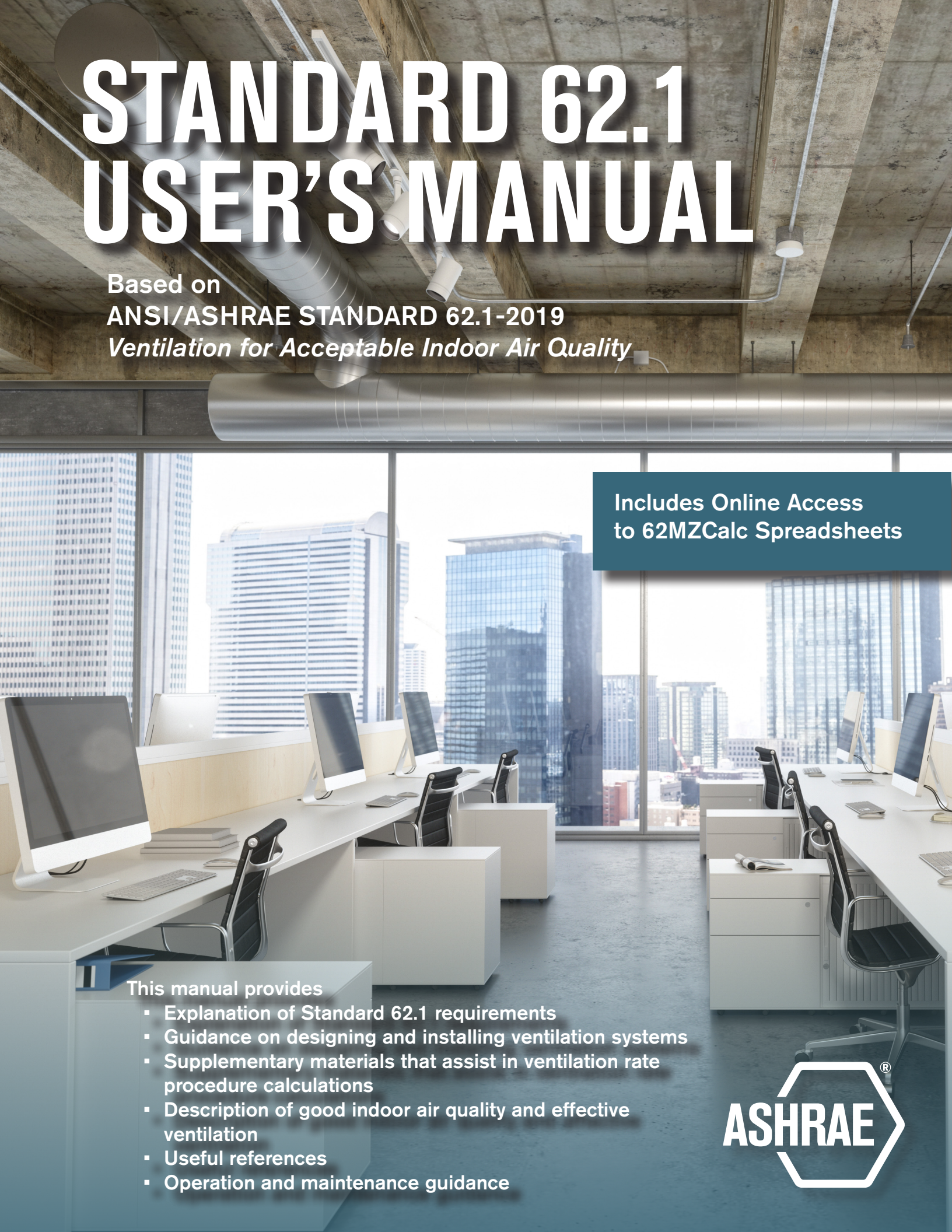
STANDARD 62.1 USER'S MANUAL

Based on
ANSI/ASHRAE STANDARD 62.1-2019
Ventilation for Acceptable Indoor Air Quality



Includes Online Access to 62MZCalc Spreadsheets

This manual provides

- Explanation of Standard 62.1 requirements
- Guidance on designing and installing ventilation systems
- Supplementary materials that assist in ventilation rate procedure calculations
- Description of good indoor air quality and effective ventilation
- Useful references
- Operation and maintenance guidance

ASHRAE®

Standard 62.1
User's Manual

Based on

ANSI/ASHRAE
Standard 62.1-2019

Ventilation for Acceptable Indoor Air Quality

Atlanta

ASHRAE Research: Improving the Quality of Life

Founded in 1894, ASHRAE is a global professional society committed to serve humanity by advancing the arts and sciences of heating ventilation, air conditioning, refrigeration and their allied fields. With world headquarters in metro Atlanta, Ga., the Society provides essential resources to improve building systems, energy efficiency, indoor air quality, refrigeration and resilience.

As an industry leader in research, standards writing, publishing, certification and continuing education, ASHRAE and its members are dedicated to promoting a healthy and sustainable built environment for all through strategic partnerships with organizations in the HVAC&R community and across related industries. The Society's worldwide membership is reflective of the impact, reputation and credibility of ASHRAE's resources within the United States and abroad.

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Preface

General Information

The explanatory material, detailed information, figures, tables, and examples contained within this user's manual are provided to aid the user in designing, installing, and operating buildings in accordance with ANSI/ASHRAE Standard 62.1-2019, *Ventilation for Acceptable Indoor Air Quality* (referred to in this manual as simply "the standard").

Standard 62.1 was written to be code-enforceable, and therefore contains only mandatory language. This manual does not reproduce the requirements of the standard but rather paraphrases and explains them. Intended to be used in conjunction with the standard, this manual

- offers information on the intent and application of Standard 62.1;
- explains the standard through the use of sample calculations and examples;
- encourages the user to apply the principles of good indoor air quality and effective ventilation when designing buildings and building systems;
- provides useful reference material to assist designers in efficiently completing a successful and compliant design;
- gives guidance to building operation and maintenance personnel; and
- instructs the user in the application of tools used for compliance with Standard 62.1-2019. In particular, three recently-revised spreadsheets, updated for the 2019 edition, that assist in the Ventilation Rate Procedure calculations are available at www.ashrae.org/62-1-2019UM.

Audience

This user's manual is intended for use by

- architects and engineers who must apply the standard to the design of their buildings;
- manufacturers of systems and components who choose to provide the industry with complying equipment;
- plan examiners and field inspectors who will be charged with enforcing the standard in areas where it is adopted as code;
- general and specialty contractors who must construct buildings in compliance with the standard; and
- operators and maintainers who must ensure the compliance of the building throughout its lifespan.

Addenda

Standard 62.1 is a dynamic document undergoing continuous maintenance with addenda, errata, and interpretations issued throughout its life. When using this manual to comply with a code based on Standard 62.1, check whether any addenda have been incorporated int that code, and read those addenda carefully. Also, if the adopted code references a version of the standard prior to 2019, then the information contained within this manual may not apply.

Published addenda to the current and previous editions of the standard are posted online at www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda.

Official Interpretations

Standing Standards Project Committee (SSPC) 62.1 provides official interpretations of the standard upon written request. Interpretations are restricted to the words contained within the standard itself and cannot encompass design reviews and/or proposals for changes. Address requests for interpretations to the Manager of Standards, ASHRAE, 180 Technology Parkway, Peachtree Corners, GA 30092.

The SSPC usually assigns the request to a subcommittee, which then reviews it and develops an interpretation. This interpretation is then voted on by the full committee. A common timeframe for a response is six to twelve months. Interpretations are posted online at www.ashrae.org/technical-resources/standards-and-guidelines/standards-interpretations.

Standard 62.1 Organization

Standard 62.1 is divided into nine sections and eleven appendices. Sections 1, 2, and 3 are administrative and do not contain any requirements:

- Section 1, "Purpose" states the purpose of the standard.
- Section 2, "Scope" describes where the standard does and does not apply.
- Section 3, "Definitions" provides definitions of terms that are used throughout the standard.

Sections 4 through 8 are the technical sections of the standard and contain the technical requirements for the design, installation, and operation of ventilation systems in buildings, as well as additional requirements that apply to features of the building other than these systems.

- Section 4, "Outdoor Air Quality" requires that the site and the quality of outdoor air be evaluated to determine whether special design considerations such as cleaning of the outdoor air are needed.
- Section 5, "Systems and Equipment" includes specific requirements for the design of ventilation systems in buildings, as well as the building envelope.
- Section 6, "Procedures" presents methods for determining the volumetric airflow rate of outdoor air that must be brought into the building through the HVAC system(s), as well as requirements for filtration and cleaning of the outdoor air.
- Section 7, "Construction and System Start-Up" contains requirements that apply during the construction and start-up phase of new construction projects.
- Section 8, "Operations and Maintenance" outlines requirements for the operation and maintenance of building ventilation systems after they are constructed.
- Section 9, "Normative References" lists documents referenced in the standards which contain additional requirements that may need to be met.

In addition to the nine primary sections, the standard contains a foreword and fifteen appendices. The foreword provides a historical perspective on the development of the standard, including a list of significant changes in 62.1-2019. Appendices A through C are normative and therefore part of the standard. This means that they contain requirements that may be used for compliance with the standard.

- Normative Appendix A, "Multiple-Zone System Ventilation Efficiency: Alternative Procedure"
- Normative Appendix B, "Separation of Exhaust Outlets and Outdoor Air Intakes"
- Normative Appendix C, "Zone Air Distribution Effectiveness: Alternate Procedures"

The remaining Appendices are informative and not part of the standard. This means that they do not contain any requirements for compliance but provide information that may be useful to users.

- Informative Appendix D, "Information on Selected National Standards and Guidelines for PM10, PM2.5, and Ozone"
- Informative Appendix E, "Acceptable Mass Balance Equations for Use with the IAQ Procedure"
- Informative Appendix F, "Simplified Ventilation Rate Calculation for Multiple-Zone Recirculating Systems Serving Only Specified Occupancy Categories in Existing Buildings"
- Informative Appendix G, "Application"
- Informative Appendix H, "Documentation"
- Informative Appendix I, "Rate Rationale"
- Informative Appendix J, "Information on Natural Ventilation"
- Informative Appendix K, "Compliance"
- Informative Appendix L, "Ventilation Rate Check Table"

- Informative Appendix M, “Informative References”
- Informative Appendix N, “Indoor Air Quality Procedure (IAQP)”
- Informative Appendix O, “Addenda Description Information”

Organization and Use of the User’s Manual

In general, the chapters of this user’s manual follow the organization of the standard. To aid the user in correlating requirements of the standard with the explanations in the user’s manual, all major headings in the manual contain corresponding section numbers from the standard in parentheses. For example, a discussion of the Natural Ventilation Procedure begins with the heading “Natural Ventilation Procedure (§6.4).” This allows the user to quickly refer to Section 6.4 of the standard, which gives the requirements for natural ventilation. The corollary is that each section of the standard has a corresponding section in the user’s manual.

Data and Analysis Tools

The following is a list of tools and documents that may be useful to fully apply the standard. Some of these items, as noted, are only applicable to specific sections of the standard:

- A current copy of Standard 62.1-2019 with errata and interpretations.
- Copies of any published addenda to Standard 62.1-2019.
- A personal computer and spreadsheet software to run the 62MZCalc spreadsheets, which are available at www.ashrae.org/62-1-2019UM.
- Referenced documents such as *ASHRAE Handbook—Fundamentals*, *ASHRAE Handbook—HVAC Systems and Equipment*, and *ASHRAE Handbook—HVAC Applications*.
- *Indoor Air Quality Guide: Best Practices for Design, Construction and Commissioning*. While the user’s manual helps you to apply the standard to meet the minimum requirements, the *IAQ Guide* describes additional tools and practices that have proven successful in other buildings and that designers can use to achieve IAQ-sensitive designs.

Acknowledgments

NORESCO, LLC prepared this update to the Standard 62.1-2016 user's manual under contract to ASHRAE. Roger Hedrick was the project manager and technical editor.

A Project Management Subcommittee (PMS) chaired by Wayne Thomann guided the user's manual update project and provided many useful review comments. The PMS included Jordan Clark, Abdel Darwich, Dan Pettway, Stephen Ray, Marwa Zaatari, Karl Peterman and Larry Schoen.

Special acknowledgement is due to Lilas Pratt, ASHRAE Manager of Special Projects, and Matt Walker, Managing Editor of Standards, for their dedication and the support they provided to the Standard 62.1 user’s manual project team.

1 Purpose

Overview (§1.1)

Standard 62.1 sets minimum outdoor air ventilation rates and requires other measures intended to provide indoor air quality that is both acceptable to human occupants and minimizes negative effects on health.

Both occupant perception and health issues affect the acceptability of indoor air quality. Therefore, both are relevant to this standard. Thermal comfort is not considered, as it is covered in ASHRAE Standard 55. Furthermore, the purpose of Standard 62.1 is broader than minimum ventilation rates, encompassing such subjects as moisture control, control of certain contaminant sources, maintenance, and air cleaning. See Example 1-A.

Indeed, the impact of indoor air quality on health, stated broadly in the purpose of Standard 62.1, is addressed in a number of ASHRAE documents. It remains an important factor in the development and implementation of standards and guidelines that benefit the general public[1].

Example 1-A Survey Indicates 35% Dissatisfaction

Q

A survey of occupant satisfaction in a school building found that 35% of teachers and students were dissatisfied with air quality. Is the building compliant with the standard?

A

The building is compliant with the standard as long as it is designed, constructed, operated, and maintained to meet the requirements of Sections 4 through 8, regardless of the level of occupant satisfaction or dissatisfaction. This high a level of dissatisfaction may warrant further investigation. While checking into occupant complaints may be advisable, it is not required by the standard.

In the special case of a system designed under the Indoor Air Quality Procedure, where the design calls for a maximum level of dissatisfaction, the 35% survey result should be compared with the design documentation, as it may or may not be compliant. Many designers would be reluctant to specify a dissatisfaction target as high as 35%, especially in a school application.

Regulatory Application (§1.2)

ASHRAE's intentions for regulatory use of the standard (such as use in codes) include construction of new buildings, additions to existing structures, and those specific changes to existing buildings explained in Sections 7 and 8.

Existing Buildings (§1.3)

While ASHRAE intends the use of the principles, materials, and methods described in the standard for the improvement of air quality in an existing building, it has not written the material with the regulation of existing buildings in mind, nor has it checked that each provision of the standard is appropriate for such use.

Therefore, adoption of the standard as a whole for the building codes, leases, and maintenance contracts of existing buildings can impose requirements that ASHRAE did not consider, some of which may be unreasonable. See Example 1-B.

Standard 62.1 is intended for guidance in the process of improving indoor air quality in existing buildings. For instance, it could be useful if applied with skilled judgment in IAQ evaluations of existing buildings, improvements to existing spaces, IAQ research studies, property condition surveys, etc.

[1] Ad Hoc Committee on Health Impacts in Standards, Report to the Board of Directors, February 6, 2000.

Users who wish to refer to the standard for regulatory or contractual use (including building codes, leases, and maintenance contracts) should read carefully those sections that they wish to invoke, as well as Appendix G of the standard.

Example 1-B Retroactive Application of the Standard

Q

A government agency is a prospective tenant in an existing office building. The lease requires that the space meet Standard 62.1-2019. Five years ago, the air handler and all the ductwork were replaced and are in excellent condition. Will the requirements of Standard 62.1 require replacement of the five-year-old air handler?

A

The air handler is unlikely to need replacement if it was compliant when it was installed. It should be examined carefully in light of the requirements in Standard 62.1-2019, as modifications may be needed to meet current requirements. In general, the requirements of the standard should be evaluated on an individual basis for their applicability in existing buildings to achieve effective upgrades and to avoid triggering requirements that might be unreasonable or impractical.

2 Scope

Spaces Covered (§2.1)

This standard applies to all spaces within buildings intended for human occupancy, except for residential dwelling units, as described below.

Residential dwelling units are not included in the scope of the standard, regardless of building height. All residential dwelling units are covered by Standard 62.2. The scope includes the phrase, "where residents are nontransient" when referring to residential dwelling units. This is meant to distinguish apartments, condominium units, and single-family houses from hotels, motels, dormitories, and jails. The latter group is included within the scope of Standard 62.1.

While Standard 62.1 covers a wide variety of spaces, the following scope sections describe limitations on the coverage provided. In instances where other applicable standards and requirements specify higher ventilation rates, the higher rates should be implemented. Such other applicable standards and requirements may include occupational safety and health regulations, information provided in material safety data sheets (MSDSs), and local building codes.

Scope of Requirements (§2.2)

The standard addresses more than just outdoor air ventilation rates. Section 5 includes requirements for the HVAC systems and equipment; Section 7 addresses construction, commissioning, and system start-up; and Section 8 addresses maintenance and operation.

Issues Covered (§2.3)

While the primary focus of the standard is determination of ventilation rates, the standard addresses a number of issues that can affect indoor air quality. These include control of contaminants and contaminant sources, outdoor air as a source of contaminants, control of contaminants generated during construction, and protection of materials during construction. The standard also addresses control of moisture to avoid IAQ issues due to microbial growth.

Laboratories, Healthcare, and Smoking Spaces (§2.4)

While the scope of Standard 62.1 includes laboratories, hospitals, and other health care spaces, ASHRAE recognizes that the minimum ventilation rate requirements of Standard 62.1 may be inadequate for some spaces. For this reason, the standard does not provide ventilation rates for three specific space types:

- Spaces where smoking is allowed or where isolation from spaces with smoking does not meet the requirements of the standard
- Health care spaces where ventilation rates are specified by ANSI/ASHRAE/ASHE Standard 170, *Ventilation of Health Care Facilities*
- Laboratory spaces containing hazardous materials

The ventilation rates recommended in Section 6 are for spaces where no smoking is allowed or that otherwise do not contain environmental tobacco smoke. These spaces are defined in the standard as *environmental tobacco smoke free (ETS-free) spaces*. Not only is it necessary to prohibit smoking in ETS-free areas, smoking areas must also be separated from ETS areas as required in Section 5.19. The standard does not provide ventilation rates for these spaces because it is not possible to specify a ventilation rate that will meet the purpose of the standard in these spaces.

Ventilation requirements for health care spaces were removed from the standard beginning in 2010, since ventilation requirements for these types of spaces are covered in Standard 170. Standard 170 requirements reference Standard 62.1, for instance in subject areas including air-handling unit casing, drain pans, and ventilation rates for areas not covered by Standard 170. Some space types are listed in both Standard 170

and Standard 62.1. The ventilation rates for these spaces listed in Standard 62.1 must be met to comply with this standard. Additional ventilation may be specified by Standard 170, and may be required in some cases, but this would not be part of compliance with Standard 62.1 and is not addressed in this user's manual. The 2019 edition of Standard 62.1 added ventilation rates for a number of occupancy categories specifically applied to outpatient health care facilities. These categories are not covered by Standard 170 because infection risk is considered low. Both Standards 62.1 and 170 should be reviewed carefully when designing health care facilities to ensure proper ventilation rates are used.

Laboratory spaces are not specifically defined in the standard, but these may have rooms where hazardous materials are used in scientific research, testing, teaching, or clinical practice. See Example 2-A. Special processes in laboratory spaces may generate contaminants with characteristics and in quantities dictating that principles of worker safety and industrial hygiene be used to define contaminant control strategies, including ventilation. Occupational safety or other standards may require the use of special capture ventilation or personal protective equipment that is not covered in this standard. These additional requirements relate only to spaces with special processes and not to conventional spaces (such as offices) located within these facilities. On the other hand, systems and equipment requirements (e.g., drain pans and airstream surfaces) apply to all space types.

Example 2-A New Administrative Wing of Laboratory Facility

Q

A designer for a new administrative wing of a laboratory facility is following internal policy that all designs meet ASHRAE Standard 62.1. The wing contains a small experimental laboratory. What portions of the new or existing facility are within the scope of ASHRAE Standard 62.1?

A

The new wing is within the scope of the standard, in accordance with Section 2.3. Even the laboratory is covered, since laboratory spaces are not exempted. Not only do the ventilation rate requirements apply in the laboratory and the rest of the addition, but so do all of the other requirements—for example, outdoor air filtration in Section 4 and airstream surfaces in Section 5. However, if the laboratory is designed for use with hazardous chemicals, then the ventilation rates in Standard 62.1 do not apply, and occupational safety or other standards will need to be used to determine ventilation rates.

With regard to the existing facility, there is insufficient information to address its applicability. The standard applies to changes to existing buildings only when such changes are specifically called out in the standard.