ADDENDA

ANSI/ASHRAE/ASHE Addendum q to
ANSI/ASHRAE/ASHE Standard 170-2021

Ventilation of Health Care Facilities

Approved by ASHRAE and the American National Standards Institute on August 30, 2024, and by the American Society for Health Care Engineering on August 14, 2024.

This addendum was approved by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. Instructions for how to submit a change can be found on the ASHRAE® website (www.ashrae.org/continuous-maintenance).

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c. offering constructive criticism for improving the Standard, or
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FOREWORD

Addendum q adds a requirement that emergency conditions be considered in the design of the HVAC systems as well as an informative appendix to point users of ANSI/ASHRAE/ASHE Standard 170 to appropriate resources and procedures for consideration during design. The appendix includes specific information related to infectious events similar to the COVID-19 pandemic and is structured to allow for additional information to be added as it relates to other types of emergency conditions.

Informative Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum q to Standard 170-2021

Add Section 5.7 as shown.

5.7 Emergency Conditions. HVAC system design and arrangement shall address the applicable recommendations contained in the facility's operational and emergency plan.

Informative Note: Refer to Informative Appendix E for additional guidance and considerations.

Reletter Informative Appendix E and modify as shown. The remainder of Appendix E is unchanged.

INFORMATIVE APPENDIX ~~E~~F
INFORMATIVE REFERENCES AND BIBLIOGRAPHY

ASHRAE. 2019a. ANSI/ASHRAE Standard 62.1, *Ventilation for Acceptable Indoor Air Quality*. Atlanta: ASHRAE.

ASHRAE. 2019b. ASHRAE Guideline 29, *Guideline for the Risk Management of Public Health and Safety in Buildings*. Atlanta: ASHRAE.

ASHRAE. 2023. *ASHRAE Handbook—HVAC Applications*. Peachtree Corners, GA: ASHRAE.

FGI. 2021. *Guidance for Designing Health and Residential Care Facilities that Respond and Adapt to Emergency Conditions*. St Louis, MO: Facility Guidelines Institute.

Add Informative Appendix E as shown.

(This appendix is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

INFORMATIVE APPENDIX E
EMERGENCY CONDITIONS

E1. DESIGN RECOMMENDATIONS FOR HIGH CONSEQUENCE INFECTION

Proactive design can provide response capabilities for disasters and emergencies. A facility's emergency plan should outline requirements for emergency conditions. A design team can incorporate these requirements. Design features should be made clear in the final documents. All features should be completely commissioned for functionality. They should be readily apparent to anyone reading the documentation at any time.

Example: A hospital's emergency plan requires every patient room on the fourth floor to be convertible to a "pandemic mode" consistent with ASHRAE Standard 241. A design team provides the design for pandemic mode. Design documents clearly show the equipment, capabilities, and sequences for the pandemic mode. Anyone reviewing the design documentation, during construction and/or operation, can easily and readily see the pandemic mode feature and clearly understand how it is to be used.

Design features for an emergency condition require compatibility with several principles, including the following:

- Do no harm.
- Protect healthcare workers, family, visitors, and patients.
- Be validated and/or functional performance tested.

Use the following process when evaluating and selecting design features:

a. **Clarify and objectify in detail the requirements of the facility emergency plan.** The design team must understand exactly what is to happen during the emergency and how it varies from normal operations. Include any supporting documentation such as risk assessment documentation, copies of facility's normal and emergency operational plans, current building plans, and control sequences (where applicable).

b. **Evaluate alternatives to meet the requirements**.
   1. Are there simple, low cost, and easily implemented approaches that can meet the requirements? Examples may include closed vs. open doors, additional in-room air treatment or filtration, and source capture (e.g., ventilated headboard).
   2. Are complex, high-cost, and/or automated approaches necessary? Examples may include cascading pressurization and compartmentalization.
   3. Use infectious aerosol modeling to compare the risk outcomes of different scenarios involving control of infectious aerosols. Infectious aerosol modeling can be done at several levels. Simplistic comparison of alternatives can be tabulated using the Wells-Riley equation with well-documented assumptions. Computational fluid dynamics, which requires significantly more effort, can be used to model room effects, including the effects of inlet and outlet locations.

c. **Choose the alternative(s).** The selected alternative(s) must meet the requirements of the emergency plan. Selection of alternatives may be based on cost, value, complexity, or feasibility.

d. **Document the design performance of the selected alternative(s).** The selected alternative should result in a known level of performance. For room airflow, this should be a known contaminant decay rate, or room clearing rate. For room-to-room performance, this should be a specific containment ratio.

e. **Specify verification of the design performance.** To be successful, the design must be constructed and tested to meet the design performance.

Example: A hospital's emergency plan requires every patient room on the fourth floor to be convertible to a "pandemic mode" consistent with ASHRAE Standard 241.

   a. **Clarify in detail.** The design team clarifies the necessary clean airflow that is required and in which rooms the clean airflow is required. The rooms and requirements are documented in a Basis of Design.
   b. **Evaluate alternatives.** The design team lists alternatives, including upgrades to the floor air handler, negative pressure room switchover capabilities, in-room permanently installed recirculating filters, temporary (not installed) in-room filters, and temporary (not installed) ventilated headboards. For each alternative, the design team prepares a design brief and evaluates costs and benefits. The design team prepares an infectious aerosol risk model that lists the alternatives along with their relative effects on infectious aerosol risk.
   c. **Choose the alternative.** The owner selects an alternative.
   d. **Document the performance.** The design team identifies the additional airflow that is required in each room. This documentation is included in the Basis of Design, on the plans and specifications, and in the facility operator's training agenda. Anyone reviewing the design documentation, during construction and/or operation, can easily and readily see the pandemic mode feature and clearly understand how it is to be used.
   e. **Specify verification.** The design team specifies a test of that airflow and an acceptable range of deviation for a representative sample of the rooms to verify that the design intent is met.

E2. ADDITIONAL INFORMATION

There are numerous additional ASHRAE publications to assist in the evaluation and design of systems for the accommodation of emergency conditions. These include, but are not limited to, the following:

- ANSI/ASHRAE Standard 113-2022, *Method of Testing for Room Air Diffusion*
- ASHRAE Standard 129-1997 (RA2002), *Measuring Air Change Effectiveness*
- ANSI/ASHRAE/IES Standard 202-2018, *Commissioning Process for Buildings and Systems*
- ASHRAE Standard 241-2023, *Control of Infectious Aerosols*
- ANSI/ASHRAE Standard 514-2023, *Risk Management for Building Water Systems: Physical, Chemical, and Microbial Hazards*

- ASHRAE Guideline 1.3-2018, *Building Operations and Maintenance Training for the HVAC&R Commissioning Process*
- ASHRAE Guideline 1.4-2019, *Preparing Systems Manuals for Facilities*
- ASHRAE Guideline 10-2023, *Interactions Affecting the Achievement of Acceptable Indoor Environments*
- ASHRAE Guideline 33-2021, *Guideline for Documenting Indoor Airflow and Contaminant Transport Modeling*

For guidance on the requirements of a typical operational and emergency plan, including the elements of a disaster and emergency and vulnerability assessment, refer to the following resources:

- FGI, *Guidelines for Design and Construction of Hospitals*
- FGI, *Guidelines for Design and Construction of Outpatient Facilities*
- FGI, *Guidelines for Design and Construction of Residential Health, Care, and Support Facilities*
- ASHRAE Guideline 29, *Guideline for the Risk Management of Public Health and Safety in Buildings*
- NFPA 99, *Health Care Facilities Code*, Chapter 4

For guidance on proactive design elements that may be considered for incorporation in the construction or renovation of the facility, refer to the following resources:

- *ASHRAE Handbook—HVAC Applications*, Chapter 9, "Health Care Facilities"
- ASHRAE, *HVAC Design Manual for Hospitals and Clinics*, Chapter 10, "Disaster Planning and Emergency Management"
- FGI, *Guidance for Designing Health and Residential Care Facilities that Respond and Adapt to Emergency Conditions*
- NHS (September 2022), *Health Building Note 04-01 Supplement 1: Special Ventilated Isolation Facilities for Patients in Acute Settings*

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ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted Standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the Standards and Guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive Technical Committee structure, continue to generate up-to-date Standards and Guidelines where appropriate and adopt, recommend, and promote those new and revised Standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date Standards and design considerations as the material is systematically revised.

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The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

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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.

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