ANSI/ASHRAE/ ASHE 170 UPDATES

STANDARD

ANSI/ASHRAE/ASHE Standard 170-2021
(Supersedes ANSI/ASHRAE/ASHE Standard 170-2017)
Includes ANSI/ASHRAE/ASHE addenda listed in Appendix F

Ventilation of Health Care Facilities

PRESENTERS

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- *FGI Board of Directors*
- Past Chair – ANSI/ASHRAE/ASHE Standard 170 *Ventilation of Health Care Facilities*
- Past Chair – ANSI/ASHRAE/ASHE Standard 189.3 *Design, Construction & Operation of Sustainable, High Performance Health Care Facilities*

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COURSE DESCRIPTION

With ASHRAE 170 as a Continuous Maintenance Document, addenda are frequently published, although not mandated by the state's adoption process. Members of the ASHRAE 170 committee will provide an overview of changes that have been incorporated into the 2021 published edition as incorporated by the FGI Guidelines along with more recent updates that have been approved or are presently in the works. Additionally, a preview will be provided of the newly drafted operational guideline for healthcare facilities.

PRESENTATION OUTLINE

Title: Updates and Upcoming Changes to ASHRAE 170
Presenters: Sheerin and Johnson

1. Course Learning Objectives
2. History of ASHRAE 170
3. ASHRAE 170 Version Applicability and Enforcement Dates
4. ASHRAE 170 Integration with FGI
5. AHCA Acceptance of Addenda
6. Published Addenda
7. Upcoming Potential Addenda
8. ASHRAE 170 Addendum Process
9. Current and Potential Activities
10. Impact of A.I. on Code and Standards including ASHRAE 170
11. Questions

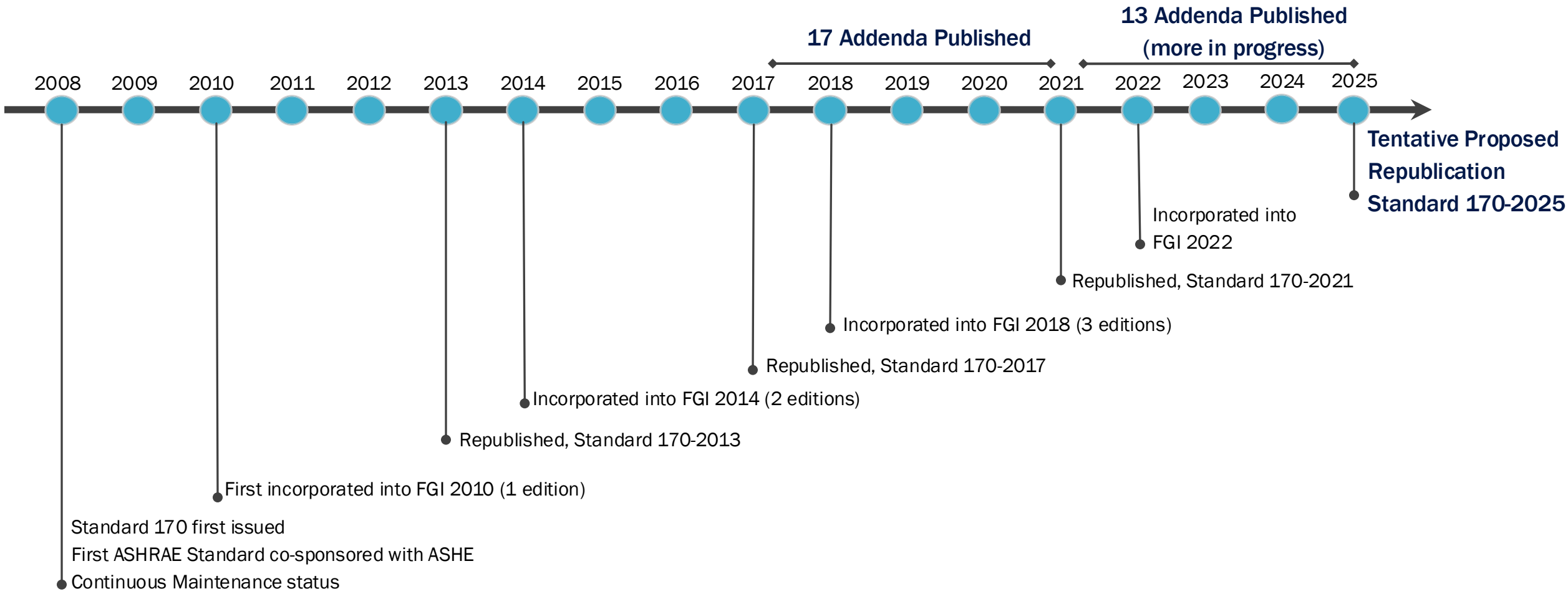
COURSE LEARNING OBJECTIVES

After participating in this seminar session, attendees will be able to:

- Define key addenda that have changed ASHRAE/ASHE Standard 170 and the key differences between the 2017 (FBC 2020) and 2021 (FBC 2023) editions.
- Understand how the new Standard 170-2021 corresponds with recently published FGI 2022 Guidelines
- Recognize the direct impact of approved addenda and the impact from the next publication

HISTORY

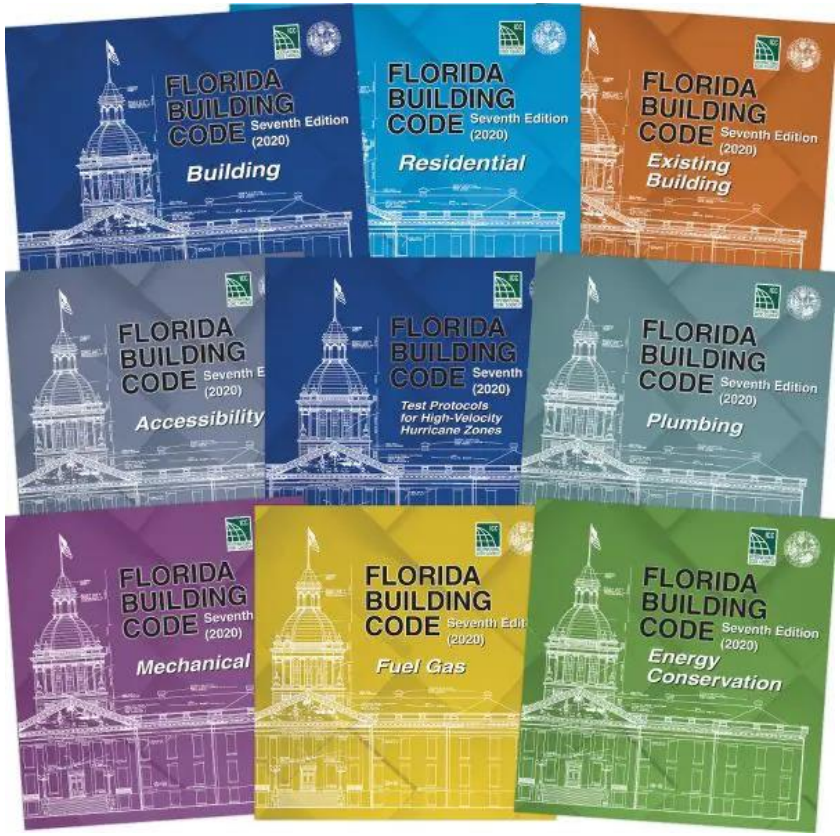
Shaping Tomorrow's Built Environment Today



REMINDER

- All projects currently being submitted to AHCA must comply with ASHRAE 170-2021 via FGI 2022 and FBC 2023
- Current Applicable Rules, Codes and Standards for AHCA projects can be found here:

  Applicable_Codes_and_Standards.pdf (myflorida.com)

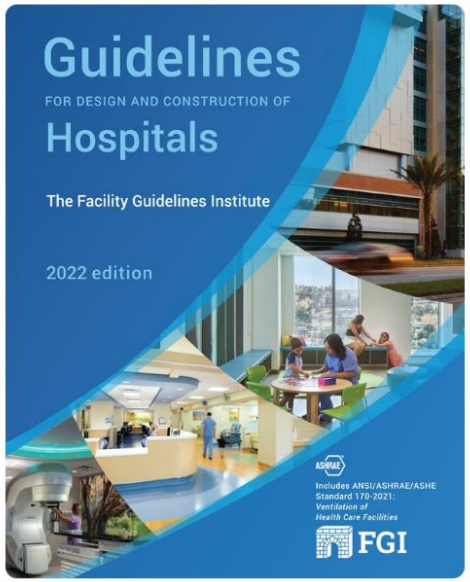


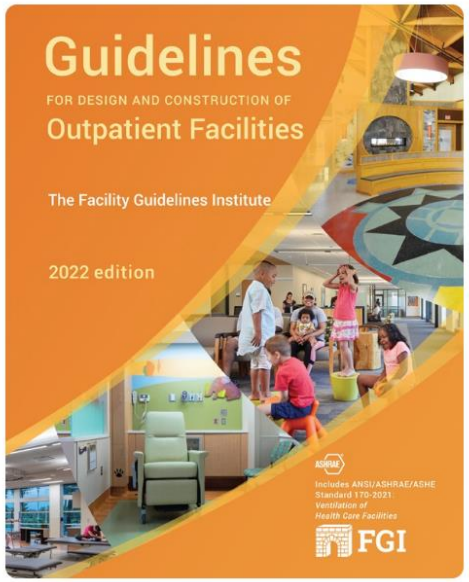
REMINDER

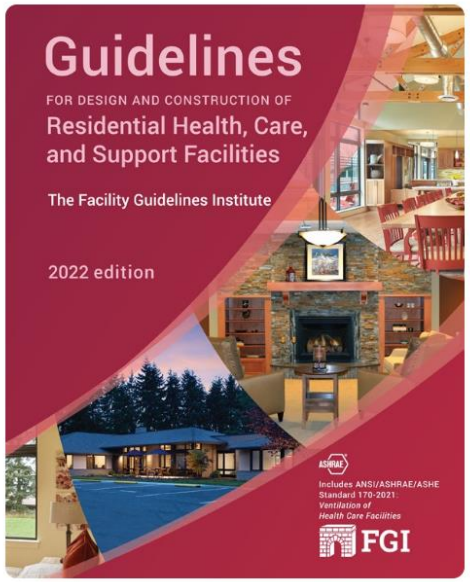
- FBC 2023 has been the applicable code since December 31, 2023
- FBC 2023 references FGI 2022 and ASHRAE 170-2021

FGI 2022 & STANDARD 170-2021

- FGI 2022 remains in three books:
  - Hospital
  - Outpatient
  - Residential







FGI 2022 includes Standard 170-2021 in its entirety including addenda c and d

ASHRAE STANDARD 170-2021

ANSI/ASHRAE/ASHE Standard 170-2017, Ventilation of Health Care Facilities

NOTE: All documents linked from this page are in **PDF-format**.

- ANSI/ASHRAE/ASHE Addendum a for Standard 170-2017 (September 2, 2020)
- ANSI/ASHRAE/ASHE Addendum b for Standard 170-2017 (March 2, 2020)
- ANSI/ASHRAE/ASHE Addendum c for Standard 170-2017 (March 2, 2020)
- ANSI/ASHRAE/ASHE Addendum g for Standard 170-2017 (Jan
- ANSI/ASHRAE/ASHE Addendum h for Standard 17
- ANSI/ASHRAE/ASHE Addendum i for
- ANSI/ASHRAE/ASHE Ad
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- ANSI/ASHRAE/ASHE Addendum p for Standard 170-2017 (March 2, 2020)
- ANSI/ASHRAE/ASHE Addendum q to Standard 170-2017 (December 13, 2019)

2021 edition includes Addenda a, b, c, d, e, g, h, i, j, k, l, m, n, p, q, r and s

For 170-2017 Addenda, go to:
https://www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda/ansi-ashrae-ashe-standard-170-2017-ventilation-of-health-care-facilities

For 170-2021 Addenda, go to:

https://www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda

ANSI/ASHRAE/ASHE Standard 170-2021, Ventilation of Health Care Facilities

- Addenda c to Standard 170-2021 (July 30, 2021)
- Addendum d to Standard 170-2021 (October 29, 2021)
- Addendum e to Standard 170-2021 (September 30, 2022)
- Addendum f to Standard 170-2021 (July 5, 202
- Addendum g to St
- Standard 170-2021 (September 30, 2022)
- Addendum j to Standard 170-2021 (July 31, 2023)

2021 edition has issued Addenda c, d, e , f, g, h and i, j, l, n, o, p, q

AHCA ACCEPTANCE OF ADDENDA

- Typically, Addenda must be more stringent than code to be accepted
- Approval to utilize addenda must be obtained on a per project basis
- Recommend document during prelim stages:
  - Stage 1/Stage 2 or Stand Up or
  - Prior to if possible

2017-ADDENDUM L: OR & IMAGING DEFINITIONS

- Coordinating with FGI - Extensive Revisions to Definitions
  - Redefine Invasive Procedure
  - Define Hybrid Operating Room
  - Define Class 1 / Class 2 / Class 3 Imaging

2017-ADDENDUM L: INVASIVE

Invasive Procedure Definitions

invasive procedure ~~*~~**:** a procedure that is performed in an aseptic surgical field and penetrates the protective surfaces of a patient's body (e.g., subcutaneous tissue, mucous membranes, cornea). An invasive procedure may fall into one or more of the following categories:

~~a. penetrates the protective surfaces of a patient's body (e.g., skin, mucous membranes, cornea);~~

~~b. is performed in an aseptic surgical field (i.e., a procedure site);~~

a.~~c. generally requires~~ Requires entry into, or opening of, a sterile body cavity~~; and~~ (i.e., cranium, chest, abdomen, pelvis, joint spaces)

b.~~d. may involve~~ Involves insertion of an indwelling foreign body

c. Includes excision and grafting of burns that cover more than 20% of total body area

d. Does not begin as an open procedure but has a recognized measurable risk of requiring conversion to an open procedure

~~***invasive imaging procedure room:*** a room in which radio-graphic imaging is used and in which instruments or devices are inserted into patients through the skin or body orifice under sterile conditions for diagnosis and/or treatment.~~

[. . .]

invasive fluoroscopy: therapeutic or diagnostic invasive procedures that require fluoroscopic imaging (e.g., cardiac catheterization, interventional angiography, cardiac stenting, or implantation of devices). (***Informative Note:*** These procedures are typically performed in a restricted or semirestricted area based on the classification of the imaging procedure being performed. Refer also to *Class 2 imaging room* for cardiac catheterization or interventional angiography, and refer to *Class 3 imaging room* for cardiac stenting or implantation of devices.)

2017-ADDENDUM L: ANESTHETIC GAS USE

Requirements when using inhalation or anesthetic gases

De-linked space from Anesthetic gas use !

7. Unless a higher ventilation rate is stipulated in Table 7.1 or elsewhere in this standard, wherever anesthetic gases are administered outside of an operating room, procedure room, or Class 2 and Class 3 imaging rooms, ventilation shall be provided at a mini-mum rate of 2 outdoor ach and 6 total ach. (***Informative Notes:*** [1] Refer to NFPA 99 for WAGD piping and gas scavenging requirements. [2] "Anesthetic gases" commonly refers to nitrous oxide and xenon but may also include halogenated volatile anesthetic agents such as desflurane, sevoflurane, and isoflurane.)

Delete Section 7.4.3 as shown.

~~**7.4.3 Imaging Procedure Rooms.** If invasive procedures occur in this type of room, ventilation shall be provided in accordance with the ventilation requirements for procedure rooms. If anesthetic gases are administered, ventilation shall be provided in accordance with the ventilation requirements for operating rooms.~~

2017-ADDENDUM L: OPERATING ROOM DEFINITIONS

Operating Room Definitions

~~***Operating room (OR)*:*** a room in the surgical suite that meets the requirements of a restricted area and is designated and equipped for performing surgical or other invasive procedures. An aseptic field is required for all procedures performed in an OR. Any form of anesthesia may be administered in an OR if proper anesthesia gas administration devices are present and waste anesthesia gas disposal systems are provided.~~

operating room (OR): a room in the surgical suite that meets the requirements of a restricted area and is designated and equipped for performing invasive procedures. (***Informative Note:*** Definition is adapted from the FGI Guidelines; see FGI [2018a, 2018b] in Informative Appendix E.)

Hybrid operating room: A room that meets the definition of an operating room and has permanently installed equipment to enable diagnostic imaging before, during and after surgical procedures. Note: Imaging equipment may include, MRI, fixed single-plane and bi-plane tomographic imaging systems, and computed tomography equipment. Use of portable imaging technology does not make an OR a hybrid operating room.

2017-ADDENDUM L: OPERATING ROOM FILTRATION

HEPA Diffuser Location

7.4.1 Operating Rooms, Operating/Surgical Cystoscopic Rooms, ~~and~~ Caesarean Delivery Rooms, and Class 3 Imaging Rooms. These rooms shall be maintained at a positive pressure with respect to all adjoining spaces at all times. A pressure differential shall be maintained at a value of at least +0.01 in. ~~we~~ of water (2.5 Pa). Each room shall have individual temperature control. These rooms shall be provided with a primary supply diffuser array that is designed as follows:

[. . .]

c. In operating rooms or Class 3 imaging rooms designated for orthopedic procedures, transplants, neurosurgery, or dedicated burn unit procedures, HEPA filters shall be provided and located in the air terminal device.

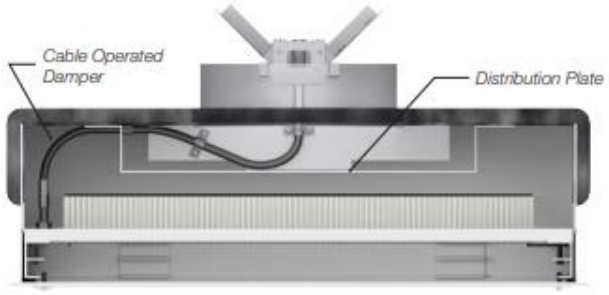


Image Reference: Price Industries

2017-ADDENDUM I: IMAGING ROOM CLASSIFICATION

Class 1 / Class 2 / Class 3 Imaging Definitions

Class 1 imaging room: diagnostic radiography, fluoroscopy, mammography, computed tomog-raphy (CT), ultrasound, magnetic resonance imaging (MRI), nuclear medicine, and other imaging modalities, including services that use natural orifice entry and do not pierce or pene-trate natural protective membranes.

Class 2 imaging room: diagnostic and therapeutic procedures such as coronary, neurological, or peripheral angiography, including electrophysiology, cardiac catheterization and interven-tional angiography and similar procedures.

Class 3 imaging room: invasive procedures including cardiac stenting, implantation of devices in an invasive fluoroscopy, and any other Class 2 procedure during which the patient will require physiological monitoring and is anticipated to require active life support.

Table 7.1 Design Parameters—Inpatient Spaces

Function of Space (ee)	Pressure Relationship to Adjacent Areas (n)	Minimum Outdoor ach	Minimum Total ach	All Room Air Exhausted Directly to Outdoors (j)	Air Recirculated by Means of Room Units (a)	Unoccupied Turndown	Minimum Filter Efficiencies (cc)	Design Relative Humidity (k), %	Design Temperature (l), °F/°C
[. . .]									
DIAGNOSTIC AND TREATMENT									
[. . .]									
~~Imaging (diagnostic and treatment)~~ Class 1 imaging room (*FGI 2.2–3.4.2.4[1][b][i]*)	NR (yy)	2	6	NR	NR	Yes	8/14	Max 60	72–78/22–26
~~Interventional and intraoperative MRI procedure room (2.2–3.5.2)~~	~~Positive~~	~~3~~	~~15~~	~~NR~~	~~No~~	~~Yes~~	~~8/14~~	~~Max 60~~	~~70–75/21–24~~
~~Interventional imaging procedure room (2.2–3.5.2)~~ Class 2 imaging room (d), (p) (*FGI 2.2-3.4.2.4[1][b][ii]*)	Positive	3	15	NR	No	Yes	8/14	Max 60	70–75/21–24
Class 3 imaging room (m), (o) (*FGI 2.2 3.4.2.4[1][b][iii]*)	Positive	4	20	NR	No	Yes	16 (xx)	20–60	68–75/21–24
~~Nuclear medicine treatment procedure room (2.2–3.6.1)~~	~~Negative~~	~~2~~	~~6~~	~~Yes~~	~~NR~~	~~Yes~~	~~8/14~~	~~NR~~	~~70–75/21–24~~

2017-ADDENDUM I: IMAGING ROOM CLASSIFICATION

Class 1 / Class 2 / Class 3 Imaging Definitions

Normative Notes for Table 7.1:

[. . .]

l. Systems shall be capable of maintaining the rooms within the range during normal operation. Lower or higher temperature shall be permitted when ~~patients'~~occupants' comfort and/or medical conditions require those conditions.

[. . .]

xx. See Section 7.4.1(c).

yy. Negative pressure is required if open mixing of isotopes or gaseous studies are performed as a part of nuclear treatment procedures within the imaging room. (***Informative Note:*** Open mixing of isotopes is typically performed in the hot lab.)

Class 1 imaging room: diagnostic radiography, fluoroscopy, mammography, computed tomog-raphy (CT), ultrasound, magnetic resonance imaging (MRI), nuclear medicine, and other imaging modalities, including services that use natural orifice entry and do not pierce or penetrate natural protective membranes.

Class 2 imaging room: diagnostic and therapeutic procedures such as coronary, neurological, or peripheral angiography, including electrophysiology, cardiac catheterization and interven-tional angiography and similar procedures.

Class 3 imaging room: invasive procedures including cardiac stenting, implantation of devices in an invasive fluoroscopy, and any other Class 2 procedure during which the patient will require physiological monitoring and is anticipated to require active life support.

2017 ADDENDA L&d:
IMAGING ROOMS - INTERPRETATION

Interpretation: Cardiac stenting and invasive fluoroscopy can be performed in both Class 2 and Class 3 type imaging rooms as determined by the healthcare organization space program required by Section 5.2a. The HVAC classification of the room based on Standard 170 does not determine the usage of the room.

Question: Is this interpretation correct?

Answer: Yes

Comments: The designer designs the space based on the level of cleanliness (class 1, class 2, class 3) the owner requests in the building program. The owner determines what procedures are appropriate within the designed space, not the designer.

2021-ADDENDUM d: IMAGING ROOMS - REDEFINED

Class 3 imaging updated to remove "Cardiac Stenting and implantation of devices in an invasive fluoroscopy"

Addendum d to Standard 170-2021

Revise Section 3 as shown. The remainder of Section 3 is unchanged.

Class 1 imaging room: an imaging room designated for the performance of patient care activities, including diagnostic radiography, fluoroscopy, mammography, computed tomography (CT), ultrasound, magnetic resonance imaging (MRI), nuclear medicine, and other imaging modalities, including services that use natural orifice entry and do not pierce or penetrate natural protective membranes.

Class 2 imaging room: an imaging room designated for the performance of patient care activities, including diagnostic and therapeutic procedures such as coronary, neurological, or peripheral angiography, including electrophysiology, cardiac catheterization, and interventional angiography and similar procedures.

Class 3 imaging room: an imaging room designated for the performance of patient care activities, including invasive procedures ~~including cardiac stenting, implantation of devices in an invasive fluoroscopy,~~ and any other Class 2 procedure during which the patient will require physiological monitoring and is anticipated to require active life support.

procedural ~~***invasive***~~ ***fluoroscopy:*** therapeutic or diagnostic ~~invasive~~ procedures that require fluoroscopic imaging (e.g., cardiac catheterization, interventional angiography, cardiac stenting, or implantation of devices). (***Informative Note:*** These procedures are typically performed in a restricted or semirestricted area based on the classification of the imaging procedure being performed. ~~Refer also to *Class 2 imaging room* for cardiac catheterization or interventional angiography and *Class 3 imaging room* for cardiac stenting or implantation of devices.~~)

2021-ADDENDUM c: FILTRATION REQUIREMENTS

Table 9-1 Design Parameters for Residential Health, Care, and Support-Specific Spaces

Function of Space (l)	Pressure Relationship to Adjacent Areas (d)	Minimum Outdoor ach	Minimum Total ach	All Room Air Exhausted Directly to Outdoors (f)	Air Recirculated by Means of Room Units (a)	Unoccupied Turndown	Minimum Filter Efficiencies (i)	Design Relative Humidity (g), %	Design Temperature (h), °F/°C
RESIDENTIAL HEALTH									
NURSING HOMES									
AII room *(FGI 3.1–2.2.4.1)* (b)	Negative	2	12	Yes	No	Yes	MERV-~~14~~13	Max 60	70–78/21–29
AII anteroom *(FGI 3.1–2.2.4.1)* (b)	Negative	NR	10	Yes	No	Yes	MERV-~~14~~13	Max 60	70–78/21–29
Occupational therapy *(FGI 3.1–3.3.3)*	NR	2	6	NR	NR	Yes	MERV-~~14~~13	NR	70–78/21–29
Physical therapy *(FGI 3.1–3.3.2)*	Negative	2	6	NR	NR	Yes	MERV-~~14~~13	NR	70–78/21–29
Resident living/activity/dining *(FGI 3.1–2.3.3)*	NR	4	4	NR	NR	Yes	MERV-~~14~~13	Max 60	70–78/21–29
Resident room *(FGI 3.1–2.2.2)*	NR	2	2	NR	NR	Yes	MERV-~~14~~13	Max 60	70–78/21–29
Resident corridor *(FGI 2.4–2.2.2)*	NR	NR	4	NR	NR	Yes	MERV-~~14~~13	NR	70–78/21–29
Toilet/bathing room *(FGI 3.1–2.2.2.6)*	Negative	NR	10	Yes	No	No	MERV-~~14~~13	NR	70–78/21–29
HOSPICE FACILITIES									
AII room *(FGI 3.2–2.2.3.1)* (c)	Negative	2	12	Yes	No	Yes	MERV-~~14~~13	Max 60	70–75/21–24
AII anteroom *(FGI 3.2–2.2.3.1)* (c)	(e)	NR	10	Yes	No	Yes	MERV-~~8~~13	Max 60	NR
Resident room *(FGI 3.2–2.2.2)*	NR	2	2	NR	NR	Yes	MERV-~~8~~13	Max 60	70–75/21–24
Resident corridor *(FGI 2.4–2.2.2)*	NR	NR	4	NR	NR	Yes	MERV-~~8~~13	NR	NR
Toilet/bathing room *(FGI 3.2–2.2.2.6)*	Negative	NR	10	Yes	No	Yes	MERV-~~8~~13	NR	70–75/21–24
RESIDENTIAL CARE AND SUPPORT									
ASSISTED LIVING FACILITIES									
Resident living/activity/dining *(FGI 4.1–2.3.3)*	NR	NR	NR	NR	NR	Yes	MERV-8	NR	NR
Resident room *(FGI 4.1–2.2.2)*	NR	NR	NR	NR	NR	Yes	MERV-8	NR	70–78/21–29
Resident corridor *(FGI 2.4–2.2.2)*	NR	NR	NR	NR	NR	Yes	MERV-8	NR	NR
Toilet/bathing room *(FGI 4.1–2.2.2.7)*	NR	NR	NR	NR	NR	Yes	MERV-8	NR	NR
SERVICE									
Clean linen storage *(FGI 2.3–4.6)*	Positive	NR	2	NR	NR	No	MERV-8	NR	72–78/22–26
Dietary storage *(FGI 2.3–4.5)*	NR	NR	2	NR	No	No	MERV-8	NR	72–78/22–26
Food preparation center *(FGI 2.3–4.5.3.3)* (e)	NR	2	10	NR	No	Yes	MERV-8	NR	72–78/22–26
Hair salon *(FGI 2.3–2.3.5 & 4.1–2.3.5)*	Negative	NR	10	Yes	NR	Yes	MERV-8	NR	70–78/21–29
Laundry, central and personal *(FGI 2.3–4.2.7)*	Negative	2	10	Yes	No	No	MERV-8	NR	NR
Linen and trash chute room *(FGI 2.3–4.6 & 2.3–4.9)*	Negative	NR	10	Yes	No	No	MERV-8	NR	NR
Medication room *(FGI 2.3–4.2.2.2)*	NR	2	4	NR	NR	Yes	MERV-8	Max 60	70–75/21–24
Soiled linen sorting and storage *(FGI 2.3–4.6)*	Negative	NR	10	Yes	No	No	MERV-8	NR	NR
Warewashing *(FGI 2.3–4.5.3.6)*	Negative	NR	10	Yes	No	Yes	MERV-8	NR	NR
SUPPORT SPACE									
Clean utility *(FGI 2.3–4.2.5)*	Positive	2	4	NR	NR	No	MERV-8 (k)	NR	NR
Environmental services room *(FGI 2.3–4.9)* (j)	Negative	NR	10	Yes	NR	No	MERV-8	NR	NR
Hazardous waste storage *(FGI 2.3–4.8)*	Negative	2	10	Yes	No	No	MERV-8	NR	NR
Nonrefrigerated body holding room	Negative	NR	10	Yes	No	No	MERV-8	NR	68–75/20–24
Soiled utility or soiled holding *(FGI 2.3–4.2.6)*	Negative	2	10	Yes	No	No	MERV-8	NR	NR

Informative Note: NR = No requirement

Nursing Home Filtration Level Decreased

Hospice Facilities Filtration Level Increased

2021-ADDENDUM f (JULY 5th, 2022)

Addendum f to Standard 170-2021

Revise Section 7.1(a)(6) as shown.

7.1 General Requirements. The following general requirements shall apply for space ventilation:

a. Spaces shall be ventilated according to Table 7-1.

[. . .]

6. For air-handling systems serving multiple spaces, system minimum outdoor air quantity shall be calculated using one of the following methods:

i. For systems serving only spaces within the scope of this standard, system minimum outdoor air quantity for an air-handling system shall be calculated as the sum of the individual space requirements as defined by this standard.

~~ii. System minimum outdoor air quantity shall be calculated by the Ventilation Rate Procedure (multiple zone formula) of ASHRAE Standard 62.1[1]. The minimum outdoor air change rate listed in this standard shall be interpreted as the zone outdoor airflow (V_{oz}) for purposes of this calculation.~~

ii. For systems serving spaces both in this standard and in ASHRAE Standard 62.1, system minimum outdoor air quantity for an air-handling system shall be calculated as the sum of

(a) the outdoor air quantity required for spaces in the scope of this standard as calculated in Section 7.1(a)(6)(i) plus

(b) the design outdoor air intake flow (V_{ot}) required for spaces in the scope of ASHRAE Standard 62.1 as calculated by ASHRAE Standard 62.1.

Informative Note: The calculation method specified in Section 7.1(a)(6)(i) does not use diversity (D), zone air distribution effectiveness (E_z), and system ventilation efficiency (E_v) from ASHRAE Standard 62.1.

Revise Section 8.1(a)(6) as shown.

8.1 Specialized Outpatient Facility Requirements. [. . .]

a. Spaces shall be ventilated according to Table 8-1.

[. . .]

6. For air-handling systems serving multiple spaces, system minimum outdoor air quantity shall be calculated using one of the following methods:

i. For systems serving only spaces within the scope of this standard, system minimum outdoor air quantity for an air-handling system shall be calculated as the sum of the individual space requirements as defined by this standard.

~~ii. System minimum outdoor air quantity shall be calculated by the Ventilation Rate Procedure (multiple zone formula) of ASHRAE Standard 62.1[1]. The minimum outdoor air change rate listed in this standard shall be interpreted as the zone outdoor airflow (V_{oz}) for purposes of this calculation.~~

ii. For systems serving spaces both in this standard and in ASHRAE Standard 62.1, system minimum outdoor air quantity for an air-handling system shall be calculated as the sum of

(a) the outdoor air quantity required for spaces in the scope of this standard as calculated in Section 8.1(a)(6)(i) plus

(b) the design outdoor air intake flow (V_{ot}) required for spaces in the scope of ASHRAE Standard 62.1 as calculated by ASHRAE Standard 62.1

Informative Note: The calculation method specified in Section 8.1(a)(6)(i) does not use diversity (D), zone air distribution effectiveness (E_z), and system ventilation efficiency (E_v) from ASHRAE Standard 62.1.

Revise Section 8.2(a)(6) and 8.2(a)(7) as shown.

8.2 General Outpatient Facility Requirements. [. . .]

The following requirements shall apply for space ventilation:

a. Spaces shall be ventilated according to Table 8-2.

[. . .]

6. For air-handling systems utilizing the cfm/person and cfm/ft^2 outdoor air ventilation rates serving spaces listed in Table 8-2 or spaces listed in Table 8-2 and ASHRAE Standard 62.1, system minimum outdoor air quantity shall be calculated by the Ventilation Rate Procedure of ASHRAE Standard 62.1[1]. The cfm/person rate shall be considered the R_p value, and the cfm/ft^2 rate shall be considered the R_a value in the calculation.

[. . .]

7. For air-handling systems serving multiple spaces and utilizing the "Minimum Outdoor ach" column, system minimum outdoor air quantity shall be calculated using one of the following methods:

i. For systems serving only spaces within the scope of this standard, system minimum outdoor air quantity for an air-handling system shall be calculated as the sum of the individual space requirements as defined by this standard.

~~ii. System minimum outdoor air quantity shall be calculated by the Ventilation Rate Procedure (multiple zone formula) of ASHRAE Standard 62.1[1]. The minimum outdoor air change rate listed in this standard shall be interpreted as the zone outdoor airflow (V_{oz}) for purposes of this calculation.~~

ii. For systems serving spaces both in this standard and in ASHRAE Standard 62.1, system minimum outdoor air quantity for an air-handling system shall be calculated as the sum of

(a) the outdoor air quantity required for spaces in the scope of this standard as calculated in Section 8.2(a)(7)(i) plus

(b) the design outdoor air intake flow (V_{ot}) required for spaces in the scope of ASHRAE Standard 62.1 as calculated by ASHRAE Standard 62.1

Informative Note: The calculation method specified in Section 8.2(a)(7)(i) does not use diversity (D), zone air distribution effectiveness (E_z), and system ventilation efficiency (E_v) from ASHRAE Standard 62.1.

Revise Section 9.1(a)(6) as shown.

9.1 General Requirements. The following general requirements shall apply for space ventilation:

a. Spaces shall be ventilated according to Table 9-1.

[. . .]

6. For air-handling systems serving multiple spaces, system minimum outdoor air quantity shall be calculated using one of the following methods:

i. For systems serving only spaces within the scope of this standard, system minimum outdoor air quantity for an air-handling system shall be calculated as the sum of the individual space requirements as defined by this standard.

~~ii. System minimum outdoor air quantity shall be calculated by the Ventilation Rate Procedure (multiple zone formula) of ASHRAE Standard 62.1[1]. The minimum outdoor air change rate listed in this standard shall be interpreted as the zone outdoor airflow (V_{oz}) for purposes of this calculation.~~

ii. For systems serving spaces both in this standard and in ASHRAE Standard 62.1, system minimum outdoor air quantity for an air-handling system shall be calculated as the sum of

(a) the outdoor air quantity required for spaces in the scope of this standard as calculated in Section 9.1(a)(6)(i) plus

(b) the design outdoor air intake flow (V_{ot}) required for spaces in the scope of ASHRAE Standard 62.1 as calculated by ASHRAE Standard 62.1

Informative Note: The calculation method specified in Section 9.1(a)(6)(i) does not use diversity (D), zone air distribution effectiveness (E_z) and system ventilation efficiency (E_v) from ASHRAE Standard 62.1.

*Combination of 62.1 and 170

*170 Calcs pushing toward 62.1 MZ Calcs

2021-ADDENDUM E: NATURAL VENTILATION (SEPTEMBER 30, 2022)

Addendum e to Standard 170-2021

Add a new Section 6.10 as shown.

6.10 Fan-Assisted Natural Ventilation

6.10.1 General Requirements. Using outdoor air through natural ventilation intakes as a means of supply air is acceptable for spaces listed in Table 6-3, provided that the air is mechanically removed from the space and meets pressure relationships, minimum total ach, and design temperature and humidity ranges listed in the "Reference Table" column. All spaces designed for natural ventilation shall include a mechanical ventilation system designed in accordance with this standard except as noted below.

6.10.2 Intakes. Fan-assisted natural ventilation intakes shall meet the following requirements:

a. Intakes shall be at least ten (10) times the crack/leakage area of the space and have a maximum face velocity of 100 fpm (0.508 m/s) at the minimum total air change rate required by this standard. (***Informative Note:*** The 100 fpm (0.508 m/s) is a sizing criterion not an operational limit. Refer to 2021 *ASHRAE Handbook—Fundamentals*, Chapter 16 for information regarding crack/leakage area of the space.)
b. The device that is mechanically removing the air shall remain operational when the intake is open.
c. Intakes shall be limited to those dimensions allowable by the local authority having jurisdiction.
d. The natural ventilation design shall maintain the pressure relationships required in Tables 7-1, 8-1, 8-2, and 9-1 with adjacent spaces.
e. Intakes shall include a screening device designed to prevent intrusion by insects and vermin.
f. Intakes shall be located such that the minimum separation distance between the intake to any specific potential outdoor contaminant source shall be equal to or greater than the separation distance listed in Table 6-1.

Exceptions to 6.10.2(f):

1. As allowed by Section 6.3.1.1, Exception 3.
2. The minimum separation distance between landscaped grade and a natural ventilation air intake shall be 3 ft (1 m).

Table 6-3 Spaces Acceptable for Natural Ventilation

Function of Space	Reference Table
General patient room	7-1
General exam room	7-1
Physical therapy	7-1
Patient bedroom	7-1
Resident room	7-1
Examination/observation	8-1
Urgent care exam	8-2
Urgent care observation	8-2
General examination room	8-2
Psychiatric examination room	8-2
Psychiatric consultation room	8-2
Psychiatric group room	8-2
Psychiatric seclusion room	8-2
Physical therapy individual room	8-2
Physical therapy exercise area	8-2
Hydrotherapy	8-2
Physical therapeutic pool	8-2
Speech therapy room	8-2
Occupational therapy room	8-2
Prosthetics and orthotics room	8-2
Dental treatment	8-2
Other dental treatment areas	8-2
Toilet room	8-2
Occupational therapy	9-1
Resident living/activity/dining	9-1
Resident room	9-1
Physical therapy	9-1
Resident corridor	9-1
Toilet/bathing room	9-1

2021-ADDENDUM E: NATURAL VENTILATION (SEPTEMBER 30, 2022)

6.10.3 Filtration. Fan-assisted natural ventilation air introduced in accordance with Section 6.10.1 is exempt from meeting the requirements of Section 6.4, provided it is part of a system meeting the requirements in this section.

6.10.4 Condensation Mitigation. Interior air barriers, insulation, or other means that separate fan-assisted naturally ventilated spaces from mechanically cooled spaces shall be provided, such that condensation does not occur on indoor surfaces.

6.10.5 Outdoor Air Quality. Fan-assisted natural ventilation air introduced in accordance with Section 6.10.1 shall meet the following requirements:

a. Comply with ASHRAE Standard 62.1, Section 4.
b. Compliance with ASHRAE Standard 62.1, Section 4.3(b)(8) shall include identification of potential biological contaminant sources.

Informative Note: Monitoring PM10 and/or PM2.5 with local sensors can be helpful in implementing natural ventilation.

Revise Informative Appendix E as shown. The remainder of Informative Appendix E is unchanged.

ASHRAE. ~~2017b~~2021. *ASHRAE Handbook—Fundamentals*. ~~Atlanta~~Peachtree Corners, GA: ASHRAE.

2021-ADDENDUM g: HYBRID O.R. (SEPTEMBER 30, 2022)

Update to definition of Hybrid Operating Room

Addendum g to Standard 170-2021

Add the following new definition to Section 3 as shown. The remainder of Section 3 is unchanged.

hybrid operating room: a room that meets the definition of an *operating room (OR)* and has permanently installed equipment to enable diagnostic imaging before, during, and after surgical procedures. (***Informative Note:*** This space is functionally equivalent to Class 3 Imaging rooms. Imaging equipment may include MRI, fixed single-plane and bi-plane tomographic imaging systems, and computed tomography equipment. Use of portable imaging technology does not make an OR a hybrid operating room.)

Revise Table 6-2 as shown. The remainder of Table 6-2 is unchanged.

Table 6-2 Supply Air Outlets

Space Designation (According to Function)	Supply Air Outlet Classification[a]
~~Operating rooms[b], procedure rooms~~ Operating rooms and Class 3 Imaging rooms[b]	Supply diffusers within the primary supply diffuser array; Group E, nonaspirating; Additional supply diffusers within the room; Group E
Procedure Rooms and Class 2 Imaging rooms	Group E

2021-ADDENDUM g: NUCLEAR MEDICINE (SEPTEMBER 30, 2022)

Nuclear Medicine Treatment and Hot Lab – Exception to requiring exhaust

Add new Section 7.7 as shown. This matches exactly Section 8.7 in the current standard.

7.7 Nuclear Medicine. Refer to Table 7-1 of this standard for both nuclear medicine treatment spaces and nuclear medicine hot-lab spaces when radiopharmaceutical preparation is performed on site (not premixed) and radioactive materials (radionuclides) are mixed/distributed from their protective containers within this room. When dose administration and preparation uses only low-level premixed radioactive materials, then negative air pressure and room exhaust is not indicated and these nuclear medicine spaces will follow the Class 1 Imaging room space of this standard for ventilation requirements.

Revise Section 8.4.1 as shown.

8.4.1 Operating Rooms (ORs), Operating/Surgical Cystoscopic Rooms, ~~and~~ Caesarean Delivery Rooms~~,~~ and Class 3 Imaging Rooms. Refer to Section 7.4.1 of this standard.

Revise Section 8.7 as shown.

8.7 Nuclear Medicine. Refer to Table 8-1 of this standard for both nuclear medicine treatment spaces and nuclear medicine hot-lab spaces when radiopharmaceutical preparation is performed on site (not premixed) and radioactive materials (radionuclides) are mixed/distributed from their protective containers within this room. ~~If~~ When dose administration ~~and on-site mixing~~ and preparation uses only low-level premixed radioactive materials, then ~~a hot lab~~ negative air pressure and room exhaust is not indicated and these nuclear medicine spaces will follow the ~~general examination~~ Class 1 Imaging room space in Table ~~8-2~~ 8-1 of this standard for ventilation requirements.

2021-ADDENDUM h: OUTPATIENT UNOCCUPIED TURNDOWN (SEPTEMBER 30, 2022)

Table 8-1 Design Parameters—Specialized Outpatient Spaces

Function of Space (f)	Pressure Relationship to Adjacent Areas (n)	Minimum Outdoor ach	Minimum Total ach	All Room Air Exhausted Directly to Outdoors (j)	Air Recirculated by Means of Room Units (a)	Unoccupied Turndown	Minimum Filter Efficiencies (c)	Design Relative Humidity (k), %	Design Temperature (l), °F/°C
SURGERY AND EMERGENCY DEPARTMENT (ED)									
Delivery (Caesarean) *(FGI 2.1–3.2.3)* (m), (o), (v), (gg)	Positive	4	20	NR	No	Yes	MERV-16 (dd)	20–60	68–75/20–24
ED human decontamination *(FGI 2.8–3.4.8)*	Negative	2	12	Yes	No	Yes (ii)	MERV-14 (cc)	NR	NR
ED exam/treatment room *(FGI 2.8–3.4.2)* (p)	NR	2	6	NR	NR	Yes (ii)	MERV-14 (cc)	Max 60	70–75/21–24
ED public waiting area *(FGI 2.8–6.2.3)*	Negative	2	12	Yes (q)	NR	Yes (ii)	MERV-8	Max 65	70–75/21–24
Operating room *(FGI 2.1–3.2.3)* (m), (o), (v), (gg)	Positive	4	20	NR	No	Yes	MERV-16 (dd)	20–60	68–75/20–24
Procedure room *(FGI 2.1–3.2.2)* (d), (o), (p)	Positive	3	15	NR	No	Yes	MERV-14	20–60	70–75/21–24
Phase I recovery (PACU) *(FGI 2.1–3.7.4)*	NR	2	6	NR	No	Yes	MERV-8	Max 60	70–75/21–24
Phase II recovery *(FGI 2.1–3.7.5)* (u)	NR	2	2	NR	NR	Yes	MERV-8	Max 60	70–75/21–24
Preprocedure patient care *(FGI 2.1–3.7.3)* (t)	NR	2	2	NR	NR	Yes	MERV-8	Max 60	70–75/21–24
Trauma room (crisis or shock) *(FGI 2.8–3.4.4)* (bb)	Positive	3	15	NR	No	Yes	MERV-14	20–60	70–75/21–24
Triage *(FGI 2.8–6.2.2.2 & 6.2.2.3)*	Negative	2	12	Yes (q)	NR	Yes (ii)	MERV-8	Max 60	70–75/21–24

2021-ADDENDUM j: BH AND MH NEW SPACE TYPE (JULY 31, 2023)

Table 7-1 Design Parameters—Inpatient Spaces

Function of Space (ee)	Pressure Relationship to Adjacent Areas (n)	Minimum Outdoor ach	Minimum Total ach	All Room Air Exhausted Directly to Outdoors (j)	Air Recirculated by Means of Room Units (a)	Unoccupied Turndown	Minimum Filter Efficiencies (cc)	Design Relative Humidity (k), %	Design Temperature (l), °F/°C
[. . .]									
BEHAVIORAL AND MENTAL HEALTH FACILITIES (k)									
Patient bedroom, resident room *(FGI 2.2–2.12.2 & 2.5–2.2.2)*	NR	2	2	NR	NR	Yes	MERV-8	NR	NR
Seclusion room *(FGI 2.1–2.4.3 & 2.2–2.12.4.3)*	NR	2	4	NR	NR	Yes	MERV-8	NR	NR
Resident Group/multipurpose/activity/dining *(FGI 2.2-3.2.2.3)*	NR	2	4	NR	NR	Yes	MERV-8	NR	NR
[. . .]									

2021-ADDENDUM i: EXHAUST DISCHARGE OUTLETS (DECEMBER 29, 2023)

Exhaust Discharge Diagram.jpg

6.3.3.2 Additional Requirements

a. Exhaust discharge outlets from AII rooms, bronchoscopy and sputum collection exhaust, pharmacy hazardous-drug exhausted enclosures, and laboratory work area chemical fume hoods shall additionally be arranged to discharge to the atmosphere in a vertical direction (with no rain cap or other device to impede the vertical momentum) and ~~at least 10 ft (3 m) above the adjoining roof level.~~ meet the following:

1. A discharge termination shall be a minimum of 10 ft (3 m) above service access level.
2. Discharge termination shall be higher than any roof surface within 4 ft (1.2 m).
3. Discharge termination shall be a minimum of 6 ft (1.8 m) from exterior walls.
4. Discharge termination shall be a minimum of 30 ft (10 m) from outdoor air intakes, openable windows/doors, and areas that are normally accessible to the public.

Exceptions to (a):

1. AII room exhaust that first passes through a high-efficiency particulate air (HEPA) filter.
2. If permitted by the AHJ, an alternate location may be used (***Informative Note:*** e.g., located adjacent to an air intake but with the exhaust discharge point above the top of the air intake). The submitted re-entrainment analysis shall demonstrate that an exhaust discharge outlet located at a distance less than 30 ft (10 m) horizontally provides a lower concentration of re-entrainment than all the areas located at a distance greater than 30 ft (10 m) horizontally on the roof level where the exhaust discharge is located.

b. Exhaust discharge outlets from laboratory work area chemical fume hoods shall discharge with a stack velocity of at least 3000 fpm (15.24 L/s).

Exception to (b): Lower discharge velocity may be permitted when an engineering analysis can demonstrate that the specific design meets the dilution criteria necessary to reduce concentration of hazardous materials in the exhaust to safe levels at all potential receptors. (See ANSI/~~AIAH~~ AIHA/ASSE Z9.5[3], Section 2.1.)

~~c. Exhaust discharge outlets from AII rooms, bronchoscopy and sputum collection exhaust, and laboratory work area chemical fume hoods shall be located not less than 25 ft (8 m) horizontally from outdoor air intakes, openable windows/doors, and areas that are normally accessible to the public.~~

~~**Exception to (c):** If permitted by the AHJ, an alternate location may be used. (***Informative Note:*** e.g., located adjacent to an air intake but with the exhaust discharge point above the top of the air intake). The submitted re-entrainment analysis shall demonstrate that an exhaust discharge outlet located at a distance less than 25 ft (8 m) horizontally provides a lower concentration of re-entrainment than all the areas located at a distance greater than 25 ft (8 m) horizontally on the roof level where the exhaust discharge is located.~~

2021-ADDENDUM n: HEPA FILTER TESTING PROTOCOL (MAY 31, 2024)

Ambiguity of “HEPA Filter” definition is resolved by listing acceptable test methods

Addendum n to Standard 170-2021

Add new definition to Section 3 as shown.

HEPA filter: a high-efficiency particulate air (HEPA) filter is a particulate air filter tested to a minimum particle capture efficiency value according to one of the following test methods:

a. IEST RP-CC001—Minimum efficiency of Type A of 99.97% at 0.3 µm particles
b. EN-1822—Minimum efficiency of Type H13 of 99.95% at MPPS (most penetrating particle size)
c. ISO 29463—Minimum efficiency of Class 35H of 99.95% at MPPS (most penetrating particle size)

Modify Exception 6.3.2.2(a) as shown.

Exception to 6.3.2.2(a): AII room exhaust that first passes through a ~~high-efficiency particulate air (~~HEPA~~)~~ filter.

Modify Section 6.4(g) as shown.

g. Any HEPA filter or filter MERV-14 or higher shall have sealing interface surfaces. ~~***(Informative Note:*** HEPA filters are those filters that remove at least 99.97% of 0.3 micron sized particles at the rated flow in accordance with the testing methods of IEST RP-CC001.3 [2005] in Informative Appendix E).~~

Modify Note dd in Table 7-1 as shown.

dd. As an alternative to the requirement for HEPA filters in Filter Bank No. 2, MERV-14 rated filters may be used in Filter Bank No. 2 if a tertiary terminal HEPA filter is provided for this space. ~~***(Informative Note:*** HEPA filters are those filters that remove at least 99.97% of 0.3 micron sized particles at the rated flow in accordance with the testing methods of IEST RP-CC001.3 [2005] in Informative Appendix E).~~

Modify Informative Appendix E as shown. The remainder of Informative Appendix E is unchanged.

INFORMATIVE APPENDIX E
INFORMATIVE REFERENCES AND BIBLIOGRAPHY

~~IEST. 2016. IEST-PR-CC001.6, *HEPA and ULPA Filters*. Arlington Heights, IL: Institute of Environmental Sciences and Technology.~~

CEN. 2019. 2019. EN 1822-1, *High efficiency air filters (EPA, HEPA and ULPA)—Part 1: Classification, performance testing, marking*. Brussels: European Committee for Standardization.

IEST. 2022. IEST RP-CC001.7. Recommended Practice (RP), *HEPA and ULPA Filters*. Schaumburg, IL: Institute of Environmental Sciences and Technology.

ISO. 2022. ISO 29463-5, *High-efficiency filters and filter media for removing particles in air—Part 5: Test method for filter elements*. Vernier, Geneva: International Organization for Standardization (ISO).

2021-ADDENDUM o: ADDITIONAL SPACES IN 7-1 (JUNE 28, 2024)

Addition of One-Room Sterile Processing Facility

Revise Table 7-1 as shown. The remainder of Table 7-1 is unchanged.

Table 7-1 Design Parameters—Inpatient Spaces (*Continued*)

Function of Space (ee)	Pressure Relationship to Adjacent Areas (n)	Minimum Outdoor ach	Minimum Total ach	All Room Air Exhausted Directly to Outdoors (j)	Air Recirculated by Means of Room Units (a)	Unoccupied Turndown	Minimum Filter Efficiencies (cc)	Design Relative Humidity (k), %	Design Temperature (l), °F/°C
[. . .]									
GENERAL SUPPORT FACILITIES: STERILE PROCESSING									
Clean assembly/workroom *(FGI 2.1–5.1.2.2[3])* (z)	Positive	2	4	NR	No	No	~~MERV-8 (gg)~~ MERV-14 (gg)	Max 60	68–73/20–23
Soiled workroom/decontamination room *(FGI 2.1–5.1.2.2[2])* (z)	Negative	2	6	Yes	No	No	MERV-8	NR	60–73/16–23
Sterile storage room (clean/sterile medical/ surgical supplies) *(FGI 2.1–5.1.2.2[4])* (z)	Positive	2	4	NR	NR	No	~~MERV-8 (gg)~~ MERV-14 (gg)	Max 60	Max 75/24
One-room sterile processing facility *(FGI 2.1-5.1.2.3)* (z) (ll)	NR	2	6	NR	No	No	MERV-14 (gg)	NR	NR
Sterilizer equipment room *(FGI 2.1-5.1.2.2(1)(b))* (z)	Negative	NR	2	NR	NR	No	MERV-8	NR	NR
Clean/sterile medical/surgical supply receiving *(FGI 2.1-5.1.2.4(2))* (z)	NR	NR	4	NR	No	No	MERV-8	NR	NR
[. . .]									

Revise Normative Notes for Table 7-1 as shown.

[. . .]

gg. ~~Minimum MERV-14 filters shall be required for spaces where sterile equipment is packed into sterile packages. Spaces where sterile products are stored but not packed shall not be required to have MERV-14 filters.~~ Minimum MERV-14 filters shall be required for spaces where sterile equipment is packed into sterile packages. MERV-8 filters may be used in place of MERV-14 in spaces where sterile products are stored in sealed packaging but are not opened or otherwise handled outside of the sealed package.

[. . .]

ll. In accordance with FGI 2.1-5.1.2.1, one-room sterile processing facilities are permitted only under certain circumstances.

2021-ADDENDUM o: UPDATES TO TABLE 8-1 (JUNE 28, 2024)

Revise Table 8-1 as shown. The remainder of Table 8-1 is unchanged.

Table 8-1 Design Parameters—Specialized Outpatient Spaces

Function of Space (f)	Pressure Relationship to Adjacent Areas (n)	Minimum Outdoor ach	Minimum Total ach	All Room Air Exhausted Directly to Outdoors (j)	Air Recirculated by Means of Room Units (a)	Unoccupied Turndown	Minimum Filter Efficiencies ©	Design Relative Humidity (k), %	Design Temperature (l), °F/°C
[. . .]									
STERILE PROCESSING (aa)									
One-room sterile processing *(FGI 2.1–4.3.2.3)*	NR	2	6	NR	No	No	MERV-14 (ee)	NR	NR
Sterilizer equipment room *(FGI 2.1–4.3.2.2)* (kk)	Negative	NR	~~10~~ 2	~~Yes~~ NR	~~No~~ NR	No	MERV-8	NR	NR
Clean workroom *(FGI 2.1–4.3.2.2.3)*	Positive	2	4	NR	No	No	MERV-14 (ee)	Max 60	60–73/16–23
Clean supply storage *(FGI 2.1–4.3.2.2.4)*	Positive	2	4	NR	NR	No	MERV-14 (ee)	Max 60	72–78/22–26
Supply receiving *(FGI 2.1–4.3.2.4)* (kk)	~~Negative~~ NR	NR	~~10~~ 4	~~Yes~~ NR	No	No	MERV-8	NR	NR
Decontamination room *(FGI 2.1–4.3.2.2)*	Negative	2	6	Yes	No	No	MERV-8	NR	60–73/16–23
[. . .]									

Revise Normative Notes for Table 8-1 as shown.

kk.Pressure relationship and room exhaust should be considered carefully by the designer with respect to connected adjacencies and general air movement from clean to dirty.

2021-ADDENDUM p: ALIGNMENT OF T/H REQUIREMENTS (AUGUST 30, 2024) TABLE 7-1 (INPATIENT)

Modify Table 7-1 as shown. The remainder of Table 7-1 is unchanged.

Table 7-1 Design Parameters—Inpatient Spaces

Function of Space (ee)	Pressure Relationship to Adjacent Areas (n)	Minimum Outdoor ach	Minimum Total ach	All Room Air Exhausted Directly to Outdoors (j)	Air Recirculated by Means of Room Units (a)	Unoccupied Turndown	Minimum Filter Efficiencies (cc)	Design Relative Humidity (k), %	Design Temperature (l), °F/°C
NURSING UNITS AND OTHER PATIENT CARE AREAS									
Phase I PACU and Phase II recovery (FGI 2.1–3.4.4 & 2.1–3.4.5)	NR	2	6	NR	No	Yes	MERV-14	~~20–60~~ Max 60	70–75/21–24
BEHAVIORAL AND MENTAL HEALTH FACILITIES (k)									
Patient bedroom, resident room *(FGI 2.2–2.12.2 & 2.5–2.2.2)*	NR	2	2	NR	NR	Yes	MERV-8	~~NR~~ Max 60	~~NR~~ 70–75/21–24
Seclusion room *(FGI 2.1–2.4.3 & 2.2–2.12.4.3)*	NR	2	4	NR	NR	Yes	MERV-8	~~NR~~ Max 60	~~NR~~ 70–75/21–24
DIAGNOSTIC AND TREATMENT									
ECT procedure room *(FGI 2.2–2.12.4.1 & 2.5–3.4)*	NR	2	4	NR	NR	Yes	MERV-8	Max 60	~~72–78/22–26~~ 70–75/21–24
Gastrointestinal endoscopy procedure room *(FGI 2.2–3.11.2 & Table 2.2-1)* (x)	NR	2	6	NR	No	Yes	MERV-8	~~20–60~~ Max 60	68–73/20–23
General examination room *(FGI 2.1–3.2)*	NR	2	4	NR	NR	Yes	MERV-8	~~Max 60~~ NR	70–75/21–24
Physical therapy *(FGI 2.2–2.13.8.16 & 2.6–3.1)*	Negative	2	6	NR	NR	Yes	MERV-8	~~Max 65~~ NR	72–80/22–27
PATIENT SUPPORT FACILITIES									
Toilet room *(FGI 2.1–2.9.2)*	Negative	NR	10	Yes	No	Yes	MERV-8	NR	~~72–78/22–26~~ NR

2021-ADDENDUM p: ALIGNMENT OF T/H REQUIREMENTS (AUGUST 30, 2024) TABLE 8-1 (OUTPATIENT)

Modify Table 8-1 as shown. The remainder of Table 8-1 is unchanged.

Table 8-1 Design Parameters—Specialized Outpatient Spaces

Function of Space (f)	Pressure Relationship to Adjacent Areas (n)	Minimum Outdoor ach	Minimum Total ach	All Room Air Exhausted Directly to Outdoors (j)	Air Recirculated by Means of Room Units (a)	Unoccupied Turndown	Minimum Filter Efficiencies (c)	Design Relative Humidity (k), %	Design Temperature (l), °F/°C
SURGERY AND EMERGENCY DEPARTMENT (ED)									
~~Phase I recovery (PACU) *(FGI 2.1–3.7.4)*~~	~~NR~~	~~2~~	~~6~~	~~NR~~	~~No~~	~~Yes~~	~~MERV-8~~	~~Max 60~~	~~70–75/21–24~~
~~Phase II recovery *(FGI 2.1–3.7.5)* (a)~~	~~NR~~	~~2~~	~~2~~	~~NR~~	~~NR~~	~~Yes~~	~~MERV-8~~	~~Max 60~~	~~70–75/21–24~~
Phase I PACU and Phase II recovery (FGI 2.1–3.4.4 & 2.1–3.4.5)	NR	2	6	NR	No	Yes	MERV-14	Max 60	70–75/21–24
DIAGNOSTIC AND TREATMENT									
Examination/observation *(FGI 2.1–3.2.1)*	NR	2	4	NR	NR	Yes	MERV-8	~~Max 60~~ NR	70–75/21–24
Pharmacy/med prep *(FGI 2.1–3.8.8.2 & 2.1–4.2.2)* (b)	Positive	2	4	NR	NR	Yes	MERV-8	~~NR~~ Max 60	~~NR~~ 70–75/21–24
Laser eye room *(FGI 2.1–3.2.2)*	NR	2	6	NR	No	Yes	MERV-8	~~Max~~ 20–60	~~68–73/20–23~~ 70–75/21–24
STERILE PROCESSING (aa)									
Clean workroom *(FGI 2.1–4.3.2.2.3)*	Positive	2	4	NR	No	No	MERV-14 (ee)	Max 60	~~60–73/16–23~~ 68–73/20–23
Clean supply storage *(FGI 2.1–4.3.2.2.4)*	Positive	2	4	NR	NR	No	MERV-14 (ee)	Max 60	~~72–78/22–26~~ Max 75
Soiled workroom or soiled holding *(FGI 2.1–3.8.12)*	Negative	2	6	Yes	No	No	MERV-8	NR	~~72–78/22–26~~ NR

2021-ADDENDUM p: ALIGNMENT OF T/H REQUIREMENTS (AUGUST 30, 2024) TABLE 9-1 (RESIDENTIAL)

Modify Table 9-1 as shown. The remainder of Table 9-1 is unchanged.

Table 9-1 Design Parameters for Residential Health, Care, and Support-Specific Spaces

Function of Space (l)	Pressure Relationship to Adjacent Areas (d)	Minimum Outdoor ach	Minimum Total ach	All Room Air Exhausted Directly to Outdoors (f)	Air Recirculated by Means of Room Units (a)	Unoccupied Turndown	Minimum Filter Efficiencies (i)	Design Relative Humidity (g), %	Design Temperature (h), °F/°C
RESIDENTIAL HEALTH									
NURSING HOMES									
AII room *(FGI 3.1–2.2.4.1)* (b)	Negative	2	12	Yes	No	Yes	MERV-13	~~Max~~ 30–60	70–78/21–29
AII anteroom *(FGI 3.1–2.2.4.1)* (b)	Negative	NR	10	Yes	No	Yes	MERV-13	~~Max 60~~ NR	~~70–78/21–29~~ NR
Occupational therapy *(FGI 3.1–3.3.3)*	NR	2	6	NR	NR	Yes	MERV-14	NR	~~70–78/21–29~~ 70–75/21–24
Physical therapy *(FGI 3.1–3.3.2)*	Negative	2	6	NR	NR	Yes	MERV-13	NR	~~70–78/21–29~~ 72–80/22–27
Toilet/bathing room *(FGI 3.1–2.2.2.6)*	Negative	NR	10	Yes	No	No	MERV-13	NR	~~70–78/21–29~~ NR
HOSPICE FACILITIES									
Toilet/bathing room *(FGI 3.2–2.2.2.6)*	Negative	NR	10	Yes	No	Yes	MERV-13	NR	~~70–75/21–24~~ NR
Resident room *(FGI 3.2–2.2.2)*	NR	2	2	NR	NR	Yes	MERV-8	Max 60	~~70–75/21–24~~ 70–78/21–29
RESIDENTIAL CARE AND SUPPORT									
SUPPORT SPACE									
Nonrefrigerated body holding room	Negative	NR	10	Yes	No	No	MERV-8	NR	~~68–75/20–24~~ 70–75/21–24

2021-ADDENDUM q: EMERGENCY CONDITIONS (AUGUST 30, 2024)

Valuable Owner Input is now Required—Intent is to Protect the Designer and the Owner

Supplement to OPR???

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

2021-ADDENDUM q: EMERGENCY CONDITIONS (AUGUST 30, 2024)

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:

2021-ADDENDUM q: EMERGENCY CONDITIONS (AUGUST 30, 2024)

Addressing Pandemic Conditions

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.

2021-ADDENDUM q: EMERGENCY CONDITIONS (AUGUST 30, 2024)

Additional References

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*

CURRENT AND POTENTIAL FUTURE ACTIVITIES

- ASHRAE 241: Space Mapping Activity
- Push to remove all normative notes
- WS 1955: Effectiveness of Ante Rooms for Isolation Rooms
- Addendum m: Defining of Room Recirculating Units
- Addendum k: Disaster Preparedness Requirements
- GPC 43: Incorporating Comments from Public Review
- Republication: ASHRAE 170-2025

ASHRAE STANDARD 241

New Standard : *Control of Infectious Aerosols*

Reduces Risk from Long Range Transmission (not Close Range (<3 ft))

Based on a Risk Model

Geek Out: Population Health Model
Wells Riley Equation iterated by a Monte Carlos Statistical Simulation
Probability of .1% Chance of Infection for 96.3% of the time.

ASHRAE STANDARD 241

Modeling parameters:
112 day seasonal cycle
Community prevalence of 1.04%, with an assumption that 3x higher prevalence in healthcare settings

ECAi (Equivalent Clean Air for Infection) is expressed in CFM/PERSON
Created a framework of assumptions to compare to 170

HC Space	Occupants	Masking	Room Size (sf)	Events/Day
Exam	3	30%	160	10
Group Treatment	20	30%	1,080	5
Patient Room	3	-	320	10
HC Waiting Room	30	30%	1,080	10
Resident	3	-	320	12

Ceiling Height 8’-10”

ASHRAE STANDARD 241

Space Type	62/170 Rate cfm/person	New 241 ECAi cfm/person	Infections Prevented / Season	Occupant Limit if No Upgrade
Exam	16	34	1	1
Group Treatment	16	67	6	5
Patient Room	32	64	1	1
Waiting Room	11	80	33	4
Resident	32	39	.3	2
Auditorium	6	56	13	16 (vs 150)
Gym	23	86	39	48 (vs 180)
Convention	10	62	27	62 (vs 400)

ASHRAE STANDARD 241

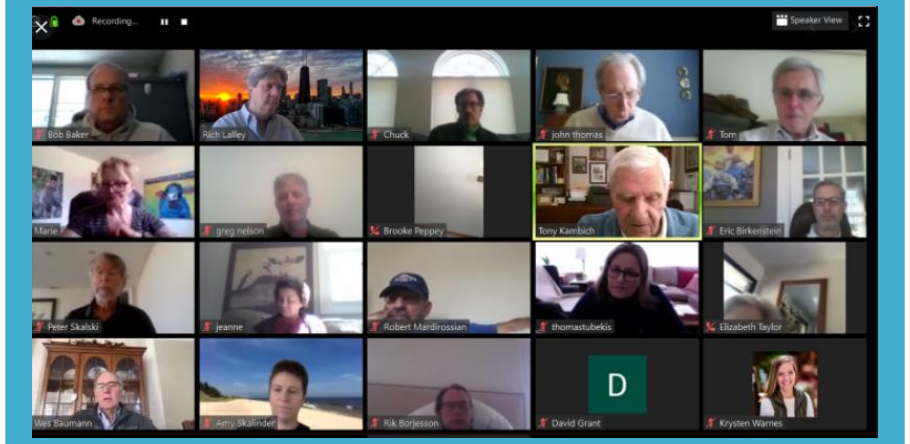
Regulatory Considerations:
Was developed on a fast track, non-ANSI approach (limited public review, no obligations to resolve comments)
Now published, intent is to open it to ANSI process at date TBD
Go forward actions will follow ANSI process

Uses:
Future Pandemic Planning
Endemic Guidance
Evaluate impact of Infection Prevention protocols (occupant limits, masking, etc)
Understand how supplemental equipment can improve staff safety (air cleaners; UV systems)
Reduce huckster-isms

Best Use: SCHOOLS! 30 occupants to 11 occupants or 2.47 to 6.77 Air Changes/Hour in 1,291 sq ft (120 m2)

ASHRAE ADDENDUM ADOPTION PROCESS

1. Continuous Maintenance
2. Addenda suggested by:
   - SSPC committee members
   - Submitted by the public through the Change
   - Proposal (CMP) Process
3. Committee Action then Public Review Period
4. ASHE Co-Sponsor Review
5. Approved for Publication




thank you!