ASHRAE/ASHE 170 2021 Update

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TLC ENGINEERING SOLUTIONS

Chair - ASHRAE/ASHE Standard 170
Ventilation of Health Care Facilities

ASHRAE CELEBRATING 125 YEARS

Past Chair – ASHRAE/ASHE Standard 189.3
Design, Construction & Operation of Sustainable, High Performance Health Care Facilities

Description

Ventilation is a critical factor in the health care built environment. In addition to the general evolution of the standard and how the committee has assessed pandemic readiness, we will also address the standard's role in combating the climate crisis.

The new Standard 170-2021 includes:

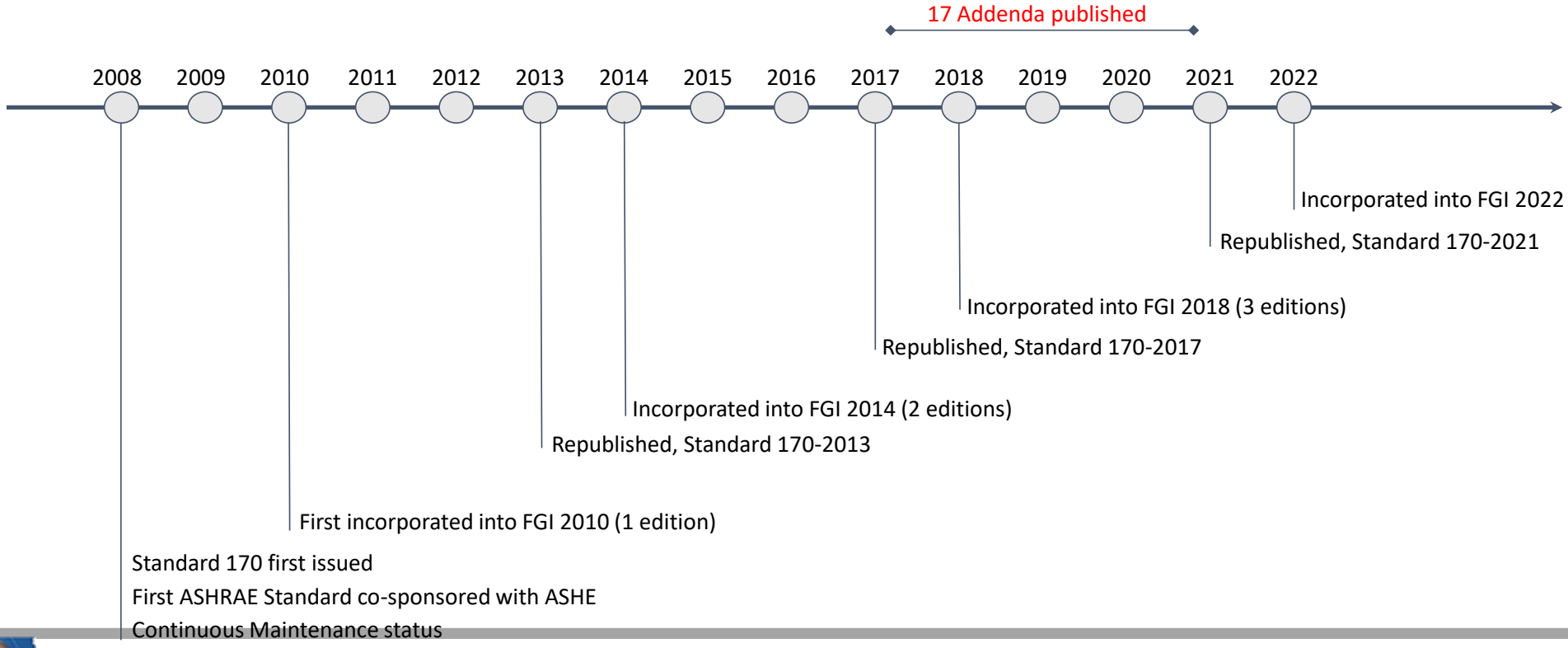
- 3 separate sections - Hospital, Outpatient and Residential
- Revised glossary definitions
- Listing of relevant FGI section numbers
- Clarification on ventilation requirements for inhalation gases

Learning Objectives

After participating in this webinar attendees will be able to:

- Define key addenda that have changed ASHRAE/ASHE Standard 170 and the key differences between the 2017 and 2021 editions.
- Understand what requirements apply when using inhalation gases.
- Recognize how Standard 170 addresses pandemic readiness
- Understand how the new Standard 170-2021 will correspond to with the soon to be published FGI 2022 Guidelines editions.

History



FGI 2018 & Standard 170-2017

FGI is revised & published every 4 years.
In between editions the following are published:

- Errata
- Interpretations

Standard 170 is a Continuous Maintenance Document.

- Approved Addenda become part of the standard

"ASHRAE keeps Standard 170 under a continuous maintenance process, which permits official changes to be made at any point over the life cycle of the document. It is the intention of FGI that addenda to 170 issued by ASHRAE after publication of the 2017 edition shall be considered part of the 2018 *Guidelines* documents."

Excerpt from 2018 FGI

FGI 2018 & Standard 170-2017

FGI 2018 is in three books:

- Hospital
- Outpatient
- Residential

Standard 170 is included in its entirety in each book.

Standard 170 mirrors the books with our Chapters 7-9

- Chapter 7 Inpatient
- Chapter 8 Outpatient
- Chapter 9 Residential

FGI 2022 & Standard 170-2021

Late 2020 Standard 170 incorporates all approved addenda

And then….updated reference for FGI Guidelines 2022 Editions

New CMPs and Addenda will continue after re-publication of Standard 170-2021

Standard 170-2021

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

Standard 170-2021 Summation

- Revised scope with improved guidance on thermal comfort conditions provided
- Extensive modifications to address Outpatient and Residential sections
- Addition of new outpatient ventilation table to address non-acute type spaces
- Extensive revisions to air filtration requirements
- Addition of new columns in the ventilation tables to prescribe filtration requirement and designate unoccupied turndown

Standard 170-2021 Summation

- Expanded guidance on separation distance requirements for varied intake and exhaust arrangements, coordinating with related ASHRAE Standard 62.1 data
- Expanded requirements to allow airborne infectious isolation room exhaust discharge to general exhaust under certain conditions
- Improved guidance on space ventilation requirements needed for anesthetic gas us
- Clarification of Class 1/ Class 2/ Class 3 imaging in coordination with FGI
- Revised Glossary definitions, including definition of “invasive procedure’
- Improved guidance to behavioral and mental health

Addendum q Fine Tuning

Addendum q to Standard 170-2017

Revise the Purpose and Scope (Sections 1 and 2) as shown.

1. PURPOSE

The purpose of this standard is to define ventilation system design requirements that provide environmental control ~~for comfort, asepsis, and odor~~ in health care facilities.

2. SCOPE

2.1 The requirements in this standard apply to patient care areas, resident care areas, and related support areas within health care facilities~~, including hospitals, nursing facilities, and outpatient facilities~~.

2.2 This standard applies to new buildings, additions to existing buildings, and those alterations to existing buildings that are identified within this standard.

2.3 This standard considers chemical, physical, and biological contaminants that can affect the delivery of medical care to patients and residents; the convalescence of patients and residents; and the safety of patients, residents, health care workers, and visitors.

2.4 This standard establishes design requirements for temperature and humidity.

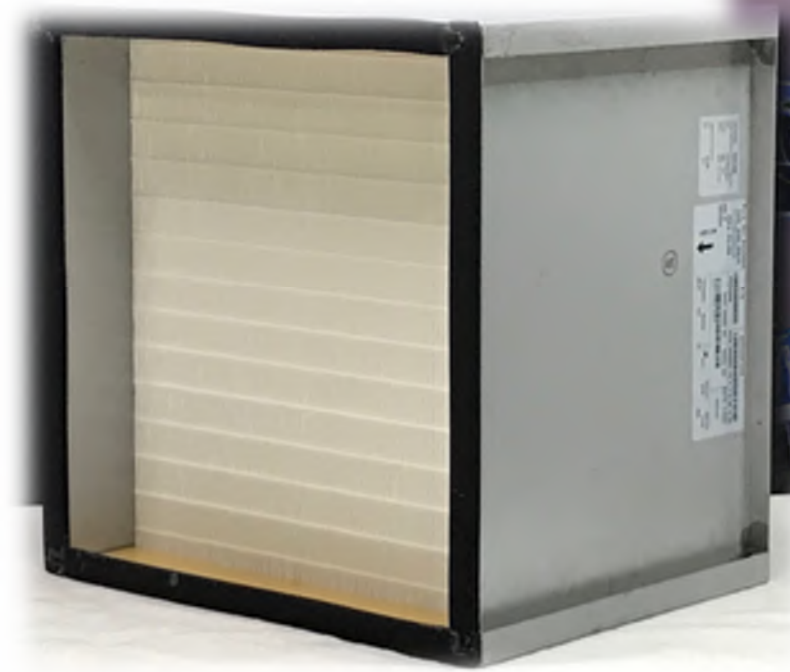
2.5 This standard establishes design requirements for odor control and asepsis.

2.6 This standard establishes design requirements for ventilation rates, including, but not limited to, outdoor air to serve health care facilities.

2.7 This standard does not establish comprehensive thermal comfort design requirements.

Addendum p Filtration& Unoccupied Turndown

- Addition of new columns in the Tables!



Addendum p Filtration& Unoccupied Turndown

TABLE 7.1 Design Parameters – ~~Hospital Spaces~~ Inpatient Spaces

Function of Space (dd)	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 (bb)
~~SURGERY AND CRITICAL CARE~~ NURSING UNITS AND OTHER PATIENT CARE AREAS							
Operating room (2.2-3.3.2) (m), (o)	Positive	4	20	NR	No	Yes	8/14
Operating/surgical cystoscopic rooms, (m), (o)	Positive	4	20	NR	No	Yes	8/14
Cesarean ~~D~~delivery room (~~Cnesarean~~) (2.2-2.11.9) (m), (o)	Positive	4	20	NR	No	Yes	8/14
~~Substerile service area~~ Sterile processing room (2.2-3.3.6.13)	NR	2	6	NR	No	Yes	8/14
~~Recovery room~~ Phase I PACU and Phase II recovery (2.2-3.3.4.3 & 2.2-3.3.4.4)	NR	2	6	NR	No	Yes	8/14
~~Critical and intensive care~~ Critical care patient care station (2.2-2.6.2)	NR	2	6	NR	No	Yes	8/14
Intermediate care patient room (2.2-2.5.2) (s)	NR	2	6	NR	NR	Yes	8/14
Wound intensive care (burn unit)	NR	2	6	NR	No	Yes	8/14
~~Newborn~~ Neonatal intensive care (2.2-2.10.2)	Positive	2	6	NR	No	Yes	8/14
Treatment room (p)	NR	2	6	NR	NR	Yes	8/14
Emergency department Trauma/resuscitation room ~~(crisis or shock)~~ (2.2-3.1.3.3(6)) (c)	Positive	3	15	NR	No	Yes	8/14
Medical/anesthesia gas storage (r) (2.2-3.3.6.1) (3))	Negative	NR	8	Yes	NR	No	8/NR
Laser eye room	Positive	3	15	NR	No	Yes	8/14
Emergency Department public waiting area (2.2-3.1.3.4)	Negative	2	12	Yes (q)	NR	No	8/14
Emergency service Triage area (2.2-3.1.3.3)	Negative	2	12	Yes (q)	NR	No	8/14
~~ER~~ Emergency department human decontamination (2.2-3.1.3.6 (8)	Negative	2	12	Yes	No	No	8/14
Radiology waiting rooms	Negative	2	12	Yes (q), (w)	NR	No	8/14
Procedure room (3.7-3.2) (o), (d)	Positive	3	15	NR	No	Yes	13/NR
Emergency department exam/treatment room (2.2-3.1.3.6) (p)	NR	2	6	NR	NR	No	8/14
~~INPATIENT NURSING~~							
Patient room (2.1-2.2)	NR	2	4(y)	NR	NR	Yes	8/14
Seclusion room (2.1-2.4.3)	NR	2	4 (y)	NR	NR	Yes	8/NR
Nourishment area or room (2.1-2.6.7)	NR	NR	2	NR	NR	Yes	8/14
Patient ~~T~~toilet room (2.1-2.2.6)	Negative	NR	10	Yes	No	No	8/NR
Newborn nursery ~~suite~~ (2.2-2.12.3.1)	NR	2	6	NR	No	Yes	8/14
Continued care nursery (2.2-2.12.3.3)	NR	2	6	NR	No	Yes	8/14

Addendum a Further Filtration Revisions

TABLE 7.1 Design Parameters – Hospital Spaces

Function of Space	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)	Minimum Filter Efficiency (ab)	Design Relative Humidity (k), %	Design Temperature (l), °F/°C
SURGERY AND CRITICAL CARE								
Operating room (m), (o)	Positive	4	20	NR	No	MERV-16 (ac)	20–60	68–75/20–24
Operating/surgical cystoscopic rooms, (m), (o)	Positive	4	20	NR	No	MERV-16	20–60	68–75/20–24
Delivery room (Caesarean) (m), (o)	Positive	4	20	NR	No	MERV-16	20–60	68–75/20–24
Substerile service area	NR	2	6	NR	No	ab	NR	NR
Recovery room	NR	2	6	NR	No	ab	20–60	70–75/21–24
Critical and intensive care	NR	2	6	NR	No	MERV-14	30–60	70–75/21–24
Intermediate care (s)	NR	2	6	NR	NR	MERV-14	max 60	70–75/21–24
Wound intensive care (burn unit)	Positive	2	6	NR	No	HEPA	40–60	70–75/21–24
Newborn intensive care	Positive	2	6	NR	No	MERV-14	30–60	72–78/22–26
Treatment room (p)	NR	2	6	NR	NR	ab	20–60	70–75/21–24
Trauma room (crisis or shock) (c)	Positive	3	15	NR	No	MERV-14	20–60	70–75/21–24
Medical/anesthesia gas storage (r)	Negative	NR	8	Yes	NR	NR	NR	NR
Laser eye room	Positive	3	15	NR	No	MERV-14	20–60	70–75/21–24
Emergency Department public waiting area	Negative	2	12	Yes (q)	NR	ab	max 65	70–75/21–24
Triage	Negative	2	12	Yes (q)	NR	MERV-14	max 60	70–75/21–24
ER decontamination	Negative	2	12	Yes	No	ab	NR	NR
Radiology waiting rooms	Negative	2	12	Yes (q), (w)	NR	ab	max 60	70–75/21–24
Procedure room (o), (d)	Positive	3	15	NR	No	MERV-14	20–60	70–75/21–24
Emergency department exam/treatment room (p)	NR	2	6	NR	NR	ab	max 60	70–75/21–24

Addendum a Further Filtration Revisions

Para 7.4.1d

In ORs 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.

Addendum b Spaces Removed from Table

- Darkroom – gone digital!
- Medical/Anesthesia Gas Storage
  - Refers to NFPA 99
- Food Prep
  - Refers to ASHRAE Std 154

Addendum c Air Classifications

- Helpful informative appendix info
- Consistency and coordination with ASHRAE Std 62.1

Addendum c to Standard 170-2017

Add new Informative Appendix B, "Air Classifications." Reletter current appendices accordingly.

INFORMATIVE APPENDIX B
AIR CLASSIFICATIONS

ASHRAE Standard 62.1 categorizes spaces into air classifications and prevents the recirculation and transfer of air under many conditions from spaces with higher air classifications to spaces with lower air classifications based on ASHRAE Standard 62.1, Section 5.16. This appendix includes guidelines on how to apply air classifications to ASHRAE/ASHE Standard 170 spaces.

a. Air classifications should be applied as indicated below and in accordance with ASHRAE Standard 62.1[1] Section 5.16.
b. Recirculation allowances by room units shall be in accordance with the room recirculation requirements of Tables 7.1, 8.1, and 9.1and Standard 62.1, Section 5.16. (***Informative note:*** This should not be construed to prevent room recirculation of air within the same space when permitted by Standard 170 but prevented by Standard 62.1 air classifications.)
c. Energy recovery devices serving Standard 170 spaces should meet the requirements of Standard 170, Section 6.8.
d. Spaces in Tables 7.1, 8.1, and 9.1 requiring 100% exhaust air should be Class 3 air.

Addendum d Intakes & Exhausts

- Coordinate with changing info in ASHRAE Std 62.1
- Consistent ASHRAE technical info across the two standards
  - 6.7.7 Building Exfiltration. Outdoor Air ventilation systems for a building shall be designed such that the total building outdoor air intake equals or exceeds the total building exhaust under all load and unoccupied turndown conditions.

Table 6.3.1.1 Air Intake Minimum Separation Distance

Potential Outdoor Contaminant Source	Minimum Distance, ft (m)
Class 2 air outlet	10 (3)
Required exhaust from ASHRAE Standard 62.1, Table 6.5, or other codes	25 (7.5)
Required exhaust from Table 7.1, 8.1, or 9.1 or Class 3 air exhaust outlet	25 (7.5)
Required exhaust from Section 6.3.2.2 or Class 4 air exhaust outlet	30 (10)
Plumbing vents	25 (7.5)
Vents, chimneys, and flues from combustion appliances and equipment	25(7.5)
Garage entry, automobile loading area, or drive-in queue	See Note 1
Truck loading area or dock, bus parking/idling area	See Note 1
Driveway, landscaped grade, sidewalk, street, or parking place directly below intake	5 (1.6)
Thoroughfare with high vehicle traffic volume	See Note 1
Roof or other above-grade surface directly below intake	3 (1)
Garbage storage/pick-up area, dumpsters	See Note 1
Cooling tower exhaust, intake, or basin	25 (7.5)

Note 1: Refer to ANSI/ASHRAE Standard 62.1[1], Table 5.5.1.

Addendum e Planning, Construction, Start-Up

Topic – Planning / Construction / Start-Up /

Re-organized narrative in Ch 5 & Ch 10

5.2 Owner Requirements. Owners/managers of health care facilities shall do the following:

a. **Space Program.** Prepare a space program, including the clinical service expected in each space and specific user equipment to be used. Specify needs for temperature, humidity, air filtration, localized and general exhaust, and pressure control that are not covered or are different than the requirements in this standard.

b. **Medical/Clinical Organizations.** Provide specific medical and clinical requirements that are different than the requirements in this standard.

c. **Facility Operational Plan.** Provide an operational plan in event of extended power or fuel outage. See Sections 6.1.2.1 and 6.1.2.2.

Addendum g ICC Mechanicals etc.

Topic – Ensure that 170 accommodates ICC Mechanical and other jurisdictions

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

a. Spaces shall be ventilated according to Table 7.1.

[. . .]

2. The ventilation requirements in this table are intended to provide for comfort as well as for asepsis and odor control in spaces of a health care facility that directly affect patient care. For spaces not specifically listed here, ventilation requirements shall be that of functionally equivalent spaces in the table. If no functionally equivalent spaces exist in the table, ventilation requirements shall be obtained from ANSI/ASHRAE Standard 62.1[+] in the absence of other codes or standards that govern those space ventilation rate requirements. Where spaces with prescribed rates in both Standard 62.1 and Table 7.1 of this standard exist, the higher of the two air change rates shall be used.

Addendum h Thermal Comfort

- Provide informative appendix info to assist users in applying ASHRAE Std 55

Addendum h to Standard 170-2017

Add new Informative Appendix B, "Thermal Comfort." Reletter current appendices accordingly.

INFORMATIVE APPENDIX B
THERMAL COMFORT

a. Section 2.7 was added to the scope of Standard 170 to better communicate that compliance with Standard 170 does not ensure compliance with ASHRAE Standard 55.

b. ASHRAE Standard 55 specifies the combination of environmental factors (temperature, thermal radiation, humidity, air speed) and personal factors (activity level and clothing) that will produce thermal conditions acceptable to the majority of healthy occupants. However, there are scenarios and spaces within health care facilities where Standard 55 does not apply or where deviations from Standard 55 are required.

c. Standard 170 provides HVAC design temperature and humidity ranges that, while potentially affecting occupant comfort, are also provided in support of therapeutic patient outcomes, aseptic practices, and worker protection.

Addendum i Humidifiers

More clarity in application of Adiabatic high pressure water type humidifiers. Improved technical jargon provided:

- Water Temperature re Legionella risk
- Water Purity level when discharged to space

6.6.3 Adiabatic Atomizing Humidifier Requirements

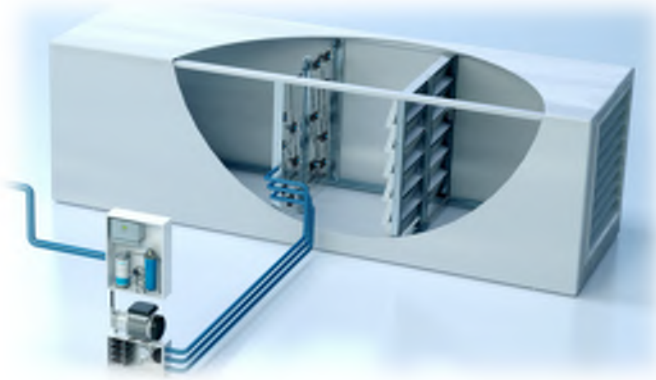
a. Humidifier water shall be treated with a reverse osmosis process, a UV-C sterilization light source, and a submicron filter. ***Informative Note:*** For more information, see ASTM (2011) in Appendix B.

b. Treated humidifier water shall be continuously circulated from the source to the humidifier valves. All valves, headers, and piping not part of the recirculation loop shall drain com-pletely when not in use. Water temperature shall be maintained within the control limits in the legionellosis risk management plan. (***Informative Note:*** For more information, refer-ence ASHRAE Guideline 12 and ASHRAE Standard 188.)

c. Ports suitable for testing water quality shall be provided in the treated humidifier water pip-ing system.

d. Moisture eliminators shall be provided as required to prevent moisture accumulation in ductwork.

e. Water purity shall meet or exceed potable water standards at the point where it enters the ventilation system, space, or water-vapor generator.



Addendum j Outpatient

Addendum j to Standard 170-2017

8. SPACE VENTILATION—OUTPATIENT SPACES

The ventilation requirements of this standard are minimums that provide control of environ-mental comfort, asepsis, and odor in outpatient spaces. However, because they are minimum requirements and because of the diversity of the population and variations in susceptibility and sensitivity, these requirements do not provide assured protection from discomfort, airborne transmission of contagions, and odors.

8.1 General Requirements.Specialized Outpatient Facility Requirements. The following facility types shall comply with this section: outpatient surgical, endoscopy, infusion, renal dialysis, freestanding emergency departments, and imaging facilities with Class 2 and 3 imag-ing rooms. The following general requirements shall apply for space ventilation:

8.2 General Outpatient Facility Requirements. All outpatient facility types other than those indicated in Section 8.1 shall comply with this Section and Table 8.2.

Unless otherwise noted in this section, all requirements for space ventilation of general outpatient spaces are contained within this section and Table 8.2, and Sections 6, 7, 9, and 10 of this standard shall not apply. For requirements related to Sections 6 and 10, which are not found in this section, refer to local and state building codes. Where no local or state code is recognized, the requirements of ANSI/ASHRAE Standard 62.1 [1] shall apply.

Addendum j

Outpatient

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)	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	MERV-16 (dd)	20–60	68–75/20–24
ED human decontamination *(FGI 2.8–3.4.8)*	Negative	2	12	Yes	No	MERV-14 (cc)	NR	NR
ED exam/treatment room *(FGI 2.8–3.4.2)* (p)	NR	2	6	NR	NR	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	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	MERV-16 (dd)	20–60	68–75/20–24
Procedure room *(FGI 2.1–3.2.2)* (d), (p), (p)	Positive	3	15	NR	No	MERV-14	20–60	70–75/21–24
Phase I recovery (PACU) *(FGI 2.1–3.7.4)*	NR	2	6	NR	No	MERV-8	Max 60	70–75/21–24
Phase II recovery *(FGI 2.1–3.7.5)* (u)	NR	2	2	NR	NR	MERV-8	Max 60	70–75/21–24
Pre-procedure patient care *(FGI 2.1–3.7.3)* (t)	NR	2	2	NR	NR	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	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	MERV-8	Max 60	70–75/21–24
DIAGNOSTIC AND TREATMENT								
Class 1 imaging room *(FGI 2.1–3.5.2.4[1][b][i])* (ff)	NR	2	6	NR	NR	MERV-8	Max 60	72–78/22–26
Class 2 imaging room *(FGI 2.1–3.5.2.4[1][b][ii])* (d), (p), (ff)	Positive	3	15	NR	No	MERV-14	20–60	70–75/21–24
Class 3 imaging room *(FGI 2.1–3.5.2.4[1][b][ii])* (m), (o), (ff)	Positive	4	20	NR	No	MERV-16 (dd)	20–60	68–75/20–24
Diagnostic imaging waiting *(FGI 2.1–3.5.10.4)* (g)	Negative	2	12	Yes (q), (r)	NR	MERV-8	Max 60	70–75/21–24

AE

Addendum j

Outpatient

Table 8-2 Design Parameters—General Outpatient Spaces (q)

Function of Space (f)	Pressure Relationship to Adjacent Areas (d)	ach Design Option: Min. Outdoor ach (q)	ach Design Option: Min. Total ach (q)	All Room Air Exhausted Directly to Outdoors (j)	Air Recirculated by Means of Room Units (a)	Min. Filter Efficiencies (c)	Design RH% (i)	Design Temperature °F/°C (k)	R_p-R_a Air-Class Design Option: Air Class (q)	R_p cfm/(L·s)/ person and Min. Space Population (q)	R_a cfm/ft²/(L·s/m) (q)
GENERAL DIAGNOSTIC AND TREATMENT											
Birthing room *(FGI 2.4-2.2)*	NR	2	3	NR (h)	NR	MERV-14	Max 60	70–75/21–24	2	10 (5) / 4	0.18 / (0.9)
Urgent care exam *(FGI 2.5-3.2.1)* (e)	NR	2	3	NR	NR	MERV-8	NR	70–75/21–24	2	7.5 (3.8) / 3	0.12 / (0.6)
Urgent care treatment *(FGI 2.5-3.2.2)* (e)	NR	2	3	NR	NR	MERV-8	NR	70–75/21–24	2	7.5 (3.8) / 3	0.18 / (0.9)
Urgent care triage *(FGI 2.5-3.2.3)*	Negative	2	3	Yes	NR	MERV-8	Max 60	70–75/21–24	3	10 (5) / 3	0.18 / (0.9)
Urgent care observation *(FGI 2.5-3.3)*	NR	2	2	NR	NR	MERV-8	NR	70–75/21–24	2	5 (2.5) / 2	0.12 / (0.6)
General examination room *(FGI 2.1-3.2.1)*	NR	2	2	NR	NR	MERV-8	NR	70–75/21–24	1	7.5 (3.8) / 3	0.12 / (0.6)
Specialty IC exam room *(FGI 2.5-3.2.3)* (b)	Negative	2	3	Yes	NR	MERV-8	Max 60	70–75/21–24	3	10 (5) / 3	0.18 / (0.9)
Laboratory work room *(FGI 2.1-4.1.2.1)* (l)	NR	2	3	NR (h)	NR	MERV-8	NR	70–75/21–24	2	7.5 (3.8) / 2	0.12 / (0.6)
Medication room *(FGI 2.1-3.8.8.2)*	NR	2	2	NR	NR	MERV-8	Max 60	70–75/21–24	1	5 (2.5) / 2	0.18 / (0.9)
Class 1 Imaging rooms *(FGI 2.1-3.5)* (g)	NR	2	3	NR	NR	MERV-8	Max 60	72–78/22–26	1	7.5 (3.8) / 2	0.12 / (0.6)
Psychiatric examination room *(FGI 2.11-3.2.2)*	NR	2	3	NR	NR	MERV-8	NR	70–75/21–24	1	5 (2.5) / 2	0.06 / (0.3)
Psychiatric consultation room *(FGI 2.11-3.2.4)*	NR	2	3	NR	NR	MERV-8	NR	70–75/21–24	1	5 (2.5) / 2	0.06 / (0.3)
Psychiatric group room *(FGI 2.11-3.2.5)*	NR	2	3	NR	NR	MERV-8	NR	70–75/21–24	1	5 (2.5) / 2	0.06 / (0.3)
Psychiatric seclusion room *(FGI 2.11-3.2.7)*	NR	2	2	NR	NR	MERV-8	NR	70–75/21–24	2	10 (5) / 3	0.12 / (0.6)
ECT procedure room (FGI 2.11-3.2.9.2)	NR	2	2	NR	NR	MERV-8	NR	70–75/21–24	1	7.5 (3.8) / 3	0.12 / (0.6)
Physical therapy individual room *(FGI 2.12-3.2.2.1)*	NR	2	3	NR (h)	NR	MERV-8	NR	70–75/21–24	2	10 (5) / 3	0.12 / (0.6)
Physical therapy exercise area *(FGI 2.12-3.2.3)*	NR	2	3	NR (h)	NR	MERV-8	NR	70–75/21–24	2	20 (10) / 2	0.18 / (0.9)

Addendum k Residential

Coordinating with FGI Residential

- 170 Chapter 9 table – spaces align with FGI Residential volume
- *Resolve applicability for specific types (Nursing, Hospice)*

Table 9.1 Design Parameters for Residential Health, Care, and Support-Specific Spaces

Function of Space	Pressure Relationship to Adjacent Areas ~~(f)~~(d)	Minimum Outdoor ach	Minimum Total ach	All Room Air Exhausted Directly to Outdoors ~~(j)~~(f)	Air Recirculated by Means of Room Units (a)	Unoccupied Turndown	Minimum Filter Efficiencies ~~(m)~~(i)	Design Relative Humidity ~~(k)~~(g), %	Design Temperature ~~(l)~~(h), °F/°C
RESIDENTIAL HEALTH									
NURSING HOMES									
All room ~~(e)~~(b)	Negative	2	12	Yes	No	Yes	13/NR	Max 60	70–7~~8~~/21–2~~9~~
All anteroom ~~(e)~~(b)	~~(e)~~Negative	NR	10	Yes	No	Yes	13/NR	~~NR~~Max 60	~~NR~~70–78/21–29
Occupational therapy	NR	2	6	NR	NR	Yes	13/NR	NR	70–7~~8~~/21–2~~9~~
Physical therapy	Negative	2	6	NR	NR	Yes	13/NR	NR	70–7~~8~~/21–2~~9~~
Resident ~~gathering~~living/activity/dining	NR	4	4	NR	NR	Yes	13/NR	~~NR~~Max 60	70–7~~8~~/21–2~~9~~
Resident room	NR	2	2	NR	NR	Yes	13/NR	~~NR~~Max 60	70–7~~8~~/21–2~~9~~
Resident ~~unit~~ corridor	NR	NR	4	NR	NR	Yes	13/NR	NR	~~NR~~70–78/21–29
Toilet/bathing room	Negative	NR	10	Yes	No	No	13/NR	NR	70–7~~8~~/21–2~~9~~
HOSPICE FACILITIES									
All room (c)	Negative	2	12	Yes	No	Yes	13/NR	Max 60	70–75/21–24
All anteroom (c)	(c)	NR	10	Yes	No	Yes	13/NR	~~NR~~Max 60	NR
Resident room	NR	2	2	NR	NR	Yes	13/NR	~~NR~~Max 60	70–75/21–24
Resident ~~unit~~ corridor	NR	NR	4	NR	NR	Yes	13/NR	NR	NR
Toilet/bathing room	Negative	NR	10	Yes	No	Yes	13/NR	NR	70–75/21–24

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

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.)

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.~~

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.

Addendum l 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~~

Addendum m Behavioral Health

General clean up and references updates

7.6 Behavioral and Mental Health ~~Psychiatric~~ Patient Areas. HVAC systems and related controls shall be secured as called for in the patient safety risk assessment. All exposed equipment located with these spaces shall have enclosures with rounded corners and tamper-resis-

Table 7.1 Design Parameters—Inpatient 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
NURSING UNITS AND OTHER PATIENT CARE AREAS									
[. . .]									
BEHAVIORAL AND MENTAL HEALTH FACILITIES (k)									
Patient bedroom, resident room (2.5–2.2.2)	NR	2	2	NR	NR	Yes	8/NR	NR	NR
Seclusion room (2.5–2.24.3)	NR	4	2	NR	NR	Yes	8/NR	NR	NR

Addendum m Behavioral Health

Utilities

Addendum m to Standard 170-2017

Revise Section 6.1.1 as shown.

6.1 Utilities

6.1.1 Ventilation Upon Loss of Electrical Power. The space ventilation and pressure relationship requirements of Tables 7.1, 8.1, and 9.1 shall be maintained for the following spaces, even in the event of loss of normal electrical power:

a. AII rooms
b. PE rooms
c. Operating rooms (ORs), including delivery rooms (Caesarean)

Exception to 6.1.1: When an essential power system is not provided or required, operation of space ventilation and pressure relationships is not required.

Informative Note: For further information, see NFPA 99 (20182~~2015~~) in Appendix B.

Addendum r Residential

Topic – Coordinate with prior addendum

Filtration Level for centralized type HVAC units

Table 9.1 Design Parameters for Residential Health, Care, and Support-Specific Spaces

Function of Space	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)	Minimum Filter Efficiencies (i)	Design Relative Humidity (g), (%)	Design Temperature (h), °F/°C
RESIDENTIAL HEALTH								
NURSING HOMES								
AII room (b)	Negative	2	12	Yes	No	MERV-14	max 60	70–75/21–24
AII anteroom (b)	Negative	NR	10	Yes	No	MERV-814	NR	NR
Resident room	NR	2	2	NR	NR	MERV-14	NR	70–75/21–24
Resident living/activity/dining	NR	4	4	NR	NR	MERV-814	NR	70–75/21–24
Resident corridor	NR	NR	4	NR	NR	MERV-814	NR	NR
Physical therapy	Negative	2	6	NR	NR	MERV-814	NR	70–75/21–24
Occupational therapy	NR	2	6	NR	NR	MERV-814	NR	70–75/21–24
Toilet/Bathing room	Negative	NR	10	Yes	No	MERV-814	NR	70–75/21–24

Addendum s Airborne Infection Isolation Room

Topic – Improve adaptability for pandemic needs

Allow HEPA discharge from A.I.I. room to general exhaust

~~c.~~b. All exhaust air from the AII rooms, associated anterooms, and associated toilet rooms shall be discharged by one of the following methods:

1. Discharged directly to the outdoors without mixing with exhaust air from any other non-AII room or general exhaust system.
2. Discharged into the general exhaust stream, provided the AII exhaust air first passes through a HEPA filter. The HEPA filter, including ductwork and fans, shall be under negative pressure (suction side) for any supplemental fan used to account for filter pressure drop, and all exhaust ductwork shall be kept under negative pressure in accordance with Section 6.3.2.1. (***Informative Note:*** If fans are used/needed due to static pressure drop of HEPA filtration, consideration should be given to the fan operation being interlocked with the general exhaust system fan. Alarms for filter loading and fan failure should be considered.)

New 2021 - Addendum a/b Natural Ventilation

Topic – Get Public Feedback on the Concept of Applying Natural Ventilation

Advisory Public Review – WILL NOT BECOME PART OF THE STANDARD

6.5.2 Unpermitted spaces. Natural ventilation is not allowed in the following spaces:

a. Operating Rooms
b. Sterile storage or sterile supply areas (including the sterile core)
c. Procedure suites
d. Interventional radiology or cardiology
e. Compounding pharmacies
f. Airborne isolation areas
g. Protective environments, burn units, or other positively pressurized spaces holding immune-suppressed patients

New 2021 - Addendum c Residential

Topic – Coordination with FGI Residential committee

Filtration Levels aligned with industry feedback

Added “Non-Refrigerated Body Holding” to Table 9 (similar to Table 7)

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									
All room *(FGI 3.1-2.2.4.1)* (b)	Negative	2	12	Yes	No	Yes	MERV-~~14~~13	max 60	70–78/21–29
All anteroom *(FGI 3.1-2.2.4.1)* (b)	Negative	NR	10	Yes	No	Yes	MERV-~~14~~13	NR	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 *(FGI3.1-2.3.3)*	NR	4	4	NR	NR	Yes	MERV-~~14~~13	NR	70–78/21–29
Resident room *(FGI 3.1-2.2.2)*	NR	2	2	NR	NR	Yes	MERV-14~~13~~	NR	70–78/21–29

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

Current & Potential Future Activities

Natural Ventilation – Separate Working Group

Coordinated with ASHRAE 62.1 recent NatVent changes

Operating Room / Class 3 Imaging Air Distribution – Diffuser Array update

Pharmacy requirements (USP 797 / 800)

100% OA Impact to Total ACH Requirements? (ie California)

Decarbonizing Healthcare

RESEARCH: contaminants of concern

RESEARCH: prioritization by space types

RESEARCH: partnerships (so elusive….to get funded and done)

Impact of Pandemic

COVID 19 - Lessons Learned?

New Addendum s

- ASHRAE Standard 170 worked !
- Benefit of Anterooms for Airborne Infectious Isolation (AII) rooms
- Challenge of adapting rooms to true AII capable (including use of HEPA exhaust)
- Ability to provide once through 100% OA via economizer or conditioned air - in portions of the ED and in other departments (ICU and patient floor(s))
- Ability to provide 100% EA - in portions of the ED and in other departments (ICU and patient floor(s))
- Need for Anterooms for (at least) a dedicated Operating Room, C-Section Room
- Benefit of DDC controls to modify HVAC terminal box parameters (i.e. change VAV to CV; increase room air changes to highest available by box / system)

COVID Resources

Recommended Resources

ASHRAE Epidemic Task Force – COVID 19 Guidance with FAQs

ASHE COVID 19 RECOVERY – excellent facility reference tool with checklists!

FGI - Emergency Conditions Committee Report

QUESTIONS

THANK YOU !