ADDENDA

ANSI/ASHRAE/ASHE Addendum a to
ANSI/ASHRAE/ASHE Standard 170-2017

Ventilation of Health Care Facilities

Approved by ASHRAE Standards Committee on July 31, 2020; by the ASHRAE Board of Directors on August 10, 2020; by the American Society for Health Care Engineering on July 28, 2020; and by the American National Standards Institute on September 1, 2020.

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FOREWORD

Addendum a clarifies filtration requirements on a space-by-space basis. The filtration levels designated, and their rational basis, are included in Informative Appendix C, Table C-1. In brief, this addendum

a. revises requirements for filters in the body of the standard, removes Table 6.4 and adds minimum filtration efficiencies by space in Table 7.1, 8.1, 9.1 and
b. adds Informative Appendix C, "Recommended Filter Efficiencies by Space Type."

Furthermore, the presentation of this addendum has been updated from earlier public review releases for ease of the users of the standard. Some of the reflected changes include:

a. The name and number of spaces in Table 7.1 are modified by Addendum p, which includes a similar format of space-by-space filter assignments. The "Function of space" names in Table 7.1 have been updated and reorganized to be consistent with addendum p revisions.
b. The filter assignments here supersede or replace those shown in Addendum p.
c. Some line items have been removed from Table 7.1 due to addenda b and p.
d. Table 7.1, 8.1, and 9.1 names have been updated to match addendum n and p revisions.
e. Addendum n and p had removed previous material that is no longer shown in this addendum or sections have different numbering due to those changes.

The change to filter requirements shifts the focus to a space-by-space-based approach, offering flexibility for users of the standard to apply the filtration selections that most rationally meets their goals for first, operational and energy costs. Filtration requirements were increased in some spaces and reduced in others, with the net effect of maintaining safe environments for occupants.

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

Addendum a to Standard 170-2017

Modify Section 6.4 as shown.

6.4 Filtration. Filtration of mechanically supplied air shall be provided as follows: ~~Filter banks shall be provided in accordance with Table 6.4. Each filter bank with an efficiency of greater than MERV 12 shall be provided with an installed manometer or differential pressure measuring device that is readily accessible and provides a reading of differential static pressure across the filter to indicate when the filter needs to be changed. (For further information, see CDC [2003] in Informative Appendix B.) All of the air provided to a space shall be filtered in accordance with Table 6.4, except as otherwise indicated in Section 7.1 for spaces that allow recirculating HVAC room units.~~

a. Particulate matter filters, minimum MERV-8, shall be provided upstream of the first heat exchanger surface of any air-conditioning system that combines return air from multiple rooms or introduces outdoor air.
b. Outdoor air shall be filtered in accordance with Table 7.1, 8.1, or 9.1.
c. Air supplied from equipment serving multiple or different spaces shall be filtered in accordance with Table 7.1, 8.1, or 9.1.
d. Air recirculated within a room shall be filtered in accordance with Table 7.1, 8.1, or 9.1, or Section 7.1(a)(5), 8.1(a)(5), or 9.1(a)(5).
e. The design shall include all necessary provisions to prevent moisture accumulating on filters located downstream of cooling coils and humidifiers.
f. Minimum filter requirements shall meet the equivalent MERV rating when tested in accordance with ANSI/ASHRAE Standard 52.2.
g. Any HEPA filter or filter MERV-14 or higher shall have sealing interface surfaces.

h. High-efficiency particulate air (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 (IEST [2005] in informative Appendix B).

i. For spaces that do not permit air recirculated by means of room units and have a minimum filter efficiency of MERV-14 or HEPA in accordance with Table 7.1, 8.1, or 9.1, the minimum filter requirement listed in Table 7.1, 8.1, or 9.1 shall be installed downstream of all wet-air cooling coils and the supply fan.

[. . .]

~~**6.4.1 First Filtration Bank.** Filter Bank No. 1 shall be placed upstream of the heating and cooling coils such that all mixed air is filtered.~~

~~**6.4.2 Second Filtration Bank.** Filter Bank No. 2 shall be installed downstream of all wet-air cooling coils and the supply fan. All second filter banks shall have sealing interface surfaces.~~

6.4.3~~1~~1 Filter Bank Blank-Off Panels. Filter bank blank-off panels shall be permanently attached to the filter bank frame, constructed of rigid materials, and have sealing surfaces equal to or greater than the filter media installed within the filter bank frame.

6.4.4~~2~~2 Filter Frames. Filter frames shall be durable and proportioned to provide an airtight fit with the enclosing ductwork. All joints between filter segments and enclosing ductwork shall have gaskets or seals to provide a positive seal against air leakage.

Modify Section 6.7.1 as shown.

6.7.1 General. Maintain the pressure relationships required in required in Tables 7.1, 8.1, and 9.1 in all modes of HVAC system operation, except as noted in the table. …. Airstream surfaces of the air distribution system ~~downstream of Filter Bank No. 2~~ shall comply with Section 5.4 of ANSI/ ASHRAE Standard 62.1.[12] …

Modify Section 6.8.1 as shown.

6.8.1 General. Energy recovery systems shall be located upstream of filters required by Section 6.4 ~~Filter Bank No. 2~~. If energy recovery systems are utilized, the systems shall not allow for any amount of cross-contamination of exhaust air back to the supply airstream via purge, leakage, carryover, or transfer except as allowed in Section 6.8.3.

Modify Section 6.9(c) as shown.

6.9 Insulation and Duct Lining

[. . .]

c. For spaces requiring a HEPA filter or minimum MERV-14 or higher filter, d~~D~~uct lining shall not be used in ductwork located downstream of filters ~~Filter Bank No. 2~~. Duct lining that is impervious, or with an impervious cover, may be allowed in terminal units, sound attenuators, and air distribution devices downstream of filters ~~Filter Bank No. 2~~. This lining and cover shall be factory installed.

[. . .]

Modify Section 7.1(a)(5)(iii) 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.

[. . .]

5. For spaces where Table 7.1 permits air to be recirculated by room units, the portion of the minimum total air changes per hour required for a space that is greater than the minimum outdoor air changes per hour required component may be provided by recirculating room HVAC units. Such recirculating room HVAC units shall
   i. not receive nonfiltered, nonconditioned outdoor air;
   ii. serve only a single space; and
   iii. provide a minimum MERV~~-6~~-8 filter for airflow passing over any surface that is designed to condense water. This filter shall be located upstream of any such cold surface, so that all of the air passing over the cold surface is filtered.

Modify Table 7.1 as shown. (Note: This addendum reflects changes previously made by Addendum p. The values in the "Minimum Filter Efficiency" column supersede or replace the values added by Addendum p.)

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									
AII anteroom (2.1–2.4.2.3) (u)	(e)	NR	10	Yes	No	Yes	~~8/14~~MERV-8	NR	NR
AII room (2.1–2.4.2) (u)	Negative	2	12	Yes	No	Yes	~~8/14~~MERV-14	Max 60	70–75/21–24
Cesarean Delivery room (2.2–2.11.9) (m), (o)	Positive	4	20	NR	No	Yes	~~8/14~~MERV-16	20–60	68–75/20–24
Combination AII/PE anteroom (2.2–2.2.4.5)	(e)	NR	10	Yes	No	No	~~8/14~~HEPA	NR	NR
Combination AII/PE room (2.2–2.2.4.5)	Positive	2	12	Yes	No	No	~~8/HEPA (dd)~~HEPA	Max 60	70-75/21-24
Continued care nursery (2.2–2.12.3.3)	N/R	2	6	N/R	No	Yes	~~8/14~~MERV-14	30–60	72–78/22–26
Critical care patient care station (2.2–2.6.2)	NR	2	6	NR	No	Yes	~~8/14~~MERV-14	30–60	70–75/21–24
Emergency department exam/treatment room (2.2–3.1.3.6) (p)	NR	2	6	NR	NR	Yes (gg)	~~8/14~~MERV-14	Max 60	70–75/21–24
Emergency department human decontamination [2.2-3.1.3.6 (8)]	Negative	2	12	Yes	No	Yes (gg)	~~8/14~~MERV-14	NR	NR
Emergency department public waiting area (2.2–3.1.3.4)	Negative	2	12	Yes (q)	NR	Yes (ff)	~~8/14~~MERV-8	Max 65	70–75/21–24
Emergency department trauma/resuscitation room (2.2–3.1.3.3[6]) (c)	Positive	3	15	NR	No	Yes	~~8/14~~MERV-14	20–60	70–75/21–24
Emergency service triage area (2.2–3.1.3.3)	Negative	2	12	Yes (q)	NR	Yes (ff)	~~8/14~~MERV-8	Max 60	70–75/21–24
Intermediate care patient room (2.2–2.5.2) (s)	NR	2	6	NR	NR	Yes	~~8/14~~MERV-14	Max 60	70–75/21–24
Labor/delivery/recovery (LDR) (2.2–2.11.3) (s)	NR	2	6	NR	NR	Yes	~~8/14~~MERV-14	Max 60	70–75/21–24
Labor/delivery/recovery/postpartum (LDRP) (2.2–2.11.3) (s)	NR	2	6	NR	NR	Yes	~~8/14~~MERV-14	Max 60	70–75/21–24
Laser eye room	Positive	3	15	NR	No	Yes	~~8/14~~MERV-14	20–60	70–75/21–24
Neonatal intensive care (2.2–2.10.2)	Positive	2	6	NR	No	Yes	~~8/14~~MERV-14	30–60	72–78/22–26
Newborn nursery (2.2–2.12.3.1)	NR	2	6	NR	No	Yes	~~8/14~~MERV-14	30–60	72–78/22–26
Nourishment area or room (2.1–2.6.7)	NR	NR	2	NR	NR	Yes	~~8/14~~MERV-8	NR	NR

Note: NR = no requirement

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
Nursery workroom (2.2–2.12.6.3)	NR	2	6	NR	No	Yes	~~8/14~~MERV-8	Max 60	72–78/22–26
Operating room (2.2–3.3.2) (m), (o)	Positive	4	20	NR	No	Yes	~~8/14~~MERV-16 (hh)	20–60	68–75/20–24
Operating/surgical cystoscopic rooms (m), (o)	Positive	4	20	NR	No	Yes	~~8/14~~MERV-16	20–60	68–75/20–24
Patient care area corridor	NR	NR	2	NR	NR	Yes	~~8/14~~MERV-14	NR	NR
Patient room (2.1–2.2)	NR	2	4 (y)	NR	NR	Yes	~~8/14~~MERV-14	Max 60	70–75/21–24
Patient toilet room (2.1–2.2.6)	Negative	NR	10	Yes	No	Yes (ff)	~~8/NR~~MERV-8	NR	NR
PE anteroom (t)	(e)	NR	10	NR	No	No	~~8/14~~HEPA	NR	NR
Phase I PACU and Phase II recovery (2.2–3.3.4.3 and 2.2–3.3.4.4)	NR	2	6	NR	No	Yes	~~8/14~~MERV-14	20–60	70–75/21–24
Procedure room (3.7–3.2) (o), (d)	Positive	3	15	NR	No	Yes	~~13/NR~~MERV-14	20–60	70–75/21–24
Protective environment room (2.2–2.2.4.4) (t)	Positive	2	12	NR	No	No	~~8/HEPA (dd)~~HEPA	Max 60	70–75/21–24
Radiology waiting rooms	Negative	2	12	Yes (q), (w)	NR	Yes (ff)	~~8/14~~MERV-8	Max 60	70–75/21–24
Seclusion room (2.1–2.4.3)	NR	2	4 (y)	NR	NR	Yes	~~8/NR~~MERV-14	Max 60	70–75/21–24
Sterile processing room (2.2–3.3.6.13)	NR	2	6	NR	No	Yes	~~8/14~~MERV-8 (gg)	NR	NR
Treatment room (p)	NR	2	6	NR	NR	Yes	~~8/14~~MERV-8	20–60	70–75/21–24
Wound intensive care (burn unit)	~~NR~~Positive	2	6	NR	No	Yes	~~8/14~~HEPA	40–60	70–75/21–24
BEHAVIORAL AND MENTAL HEALTH FACILITIES (k)									
Patient bedroom, resident room (2.5–2.2.2)	NR	2	2	NR	NR	Yes	~~8/NR~~MERV-14	NR	NR
Seclusion room (2.5–2.24.3)	NR	4	2	NR	NR	Yes	~~8/NR~~MERV-14	NR	NR
DIAGNOSTIC AND TREATMENT									
Bronchoscopy, sputum collection, and pentamidine administration	Negative	2	12	Yes	No	Yes	~~8/14~~MERV-14	NR	68–73/20–23
Dialysis treatment area	NR	2	6	NR	NR	Yes	~~8/NR~~MERV-8	NR	72–78/22–26
Dialyzer reprocessing room	Negative	NR	10 (bb)	Yes	No	Yes (ff)	~~8/NR~~MERV-8	NR	NR
ECT procedure room (2.5–3.4.2.2)	NR	2	4	NR	NR	Yes	~~8/14~~MERV-8	Max 60	72–78/22–26
Endoscope cleaning	Negative	2	10	Yes	No	No	~~8/14~~MERV-8	NR	NR

Note: NR = no requirement

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
Gastrointestinal endoscopy procedure room (x)	NR	2	6	NR	No	Yes	~~8/14~~MERV-8	20–60	68–73/20–23
General examination room	NR	2	4	NR	NR	Yes	~~8/14~~MERV-8	Max 60	70–75/21–24
Hydrotherapy	Negative	2	6	NR	NR	Yes	~~8/NR~~MERV-8	NR	72–80/22–27
Imaging (diagnostic and treatment)	NR	2	6	NR	NR	Yes	~~8/14~~MERV-8	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~~MERV-14	Max 60	70–75/21–24
Interventional imaging procedure room (2.2–3.5.2)	Positive	3	15	NR	No	Yes	~~8/14~~MERV-14	Max 60	70–75/21–24
Medication room	NR	2	4	NR	NR	Yes	~~8/14~~MERV-8	Max 60	70–75/21–24
Nuclear medicine hot lab	Negative	NR	6	Yes	No	Yes (ff)	~~8/NR~~MERV-8	NR	70–75/21–24
Nuclear medicine procedure room (2.2–3.6.1)	Negative	2	6	Yes	NR	Yes	~~8/14~~MERV-14	NR	70–75/21–24
Physical therapy	Negative	2	6	NR	NR	Yes	~~8/NR~~MERV-8	Max 65	72–80/22–27
Special examination room (aa)	NR	2	6	NR	NR	Yes	~~8/14~~MERV-14 (ii)	Max 60	70–75/21–24
Treatment room	NR	2	6	NR	NR	Yes	~~8/14~~MERV-8	Max 60	70–75/21–24
PATIENT SUPPORT FACILITIES									
Bedpan room	Negative	NR	10	Yes	No	No	~~8/NR~~MERV-8	NR	NR
Environmental services room (2.1–4.3.8.12)	Negative	NR	10	Yes	No	No	~~8/NR~~MERV-8	NR	NR
Food and supply storage (2.1–4.3.8.11)	NR	NR	2	NR	No	No	~~8/NR~~MERV-8	NR	72–78/22–26
Food preparation areas (i) (2.1–4.3.2)	NR	2	10	NR	No	Yes	~~8/NR~~MERV-8	NR	72–78/22–26
Laboratory work area, bacteriology (f), (v)	Negative	2	6	Yes	NR	Yes	~~13/NR~~MERV-8	NR	70–75/21–24
Laboratory work area, biochemistry (f), (v)	Negative	2	6	Yes	NR	Yes	~~13/NR~~MERV-8	NR	70–75/21–24
Laboratory work area, cytology (f), (v)	Negative	2	6	Yes	NR	Yes	~~13/NR~~MERV-8	NR	70–75/21–24
Laboratory work area, general (f), (v)	Negative	2	6	NR	NR	Yes	~~13/NR~~MERV-8	NR	70–75/21–24
Laboratory work area, glasswashing (f)	Negative	2	10	Yes	NR	Yes	~~13/NR~~MERV-8	NR	NR
Laboratory work area, histology (f), (v)	Negative	2	6	Yes	NR	Yes	~~13/NR~~MERV-8	NR	70–75/21–24
Laboratory work area, media transfer (f), (v)	Positive	2	4	NR	NR	Yes	~~13/NR~~MERV-8	NR	70–75/21–24
Laboratory work area, microbiology (f), (v)	Negative	2	6	Yes	NR	Yes	~~13/NR~~MERV-8	NR	70–75/21–24

Note: NR = no requirement

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
Laboratory work area, nuclear medicine (f), (v)	Negative	2	6	Yes	NR	Yes	~~13/NR~~MERV-8	NR	70–75/21–24
Laboratory work area, pathology (f), (v)	Negative	2	6	Yes	NR	No	~~13/NR~~MERV-8	NR	70–75/21–24
Laboratory work area, serology (f), (v)	Negative	2	6	Yes	NR	Yes	~~13/NR~~MERV-8	NR	70–75/21–24
Laboratory work area, sterilizing (f)	Negative	2	10	Yes	NR	Yes	~~13/NR~~MERV-8	NR	70–75/21–24
Pharmacy Services: Pharmacy Areas (b) (2.1–4.2.2)	Positive	2	4	NR	NR	Yes	~~8/14~~MERV-8	Max 60	70–75/21–24
Toilet room (2.1–4.3.9.1)	Negative	NR	10	Yes	No	Yes	~~8/NR~~MERV-8	NR	72–78/22–26
Warewashing (2.1–4.3.4) (r)	Negative	NR	NR	Yes	No	Yes	~~8/NR~~MERV-8	NR	NR
GENERAL SUPPORT FACILITIES: STERILE PROCESSING									
Clean assembly/workroom (2.1–5.1.2) (z)	Positive	2	4	NR	No	No	~~8/14~~MERV-8 (gg)	Max 60	68–73/20–23
Soiled workroom/decontamination room (2.1–5.1.3) (z)	Negative	2	6	Yes	No	No	~~8/NR~~MERV-8	NR	60–73/16–23
Sterile storage room (clean/sterile medical/ surgical supplies (2.1–5.1.4.1) (z)	Positive	2	4	NR	NR	No	~~8/14~~MERV-8 (gg)	Max 60	Max 75/24
OTHER GENERAL SUPPORT FACILITIES									
Autopsy room (2.1–5.7.2.2)	Negative	2	12	Yes	No	No	~~8/14~~MERV-8	NR	68–75/20–24
Clean linen storage room (2.1–5.2.3.2)	Positive	NR	2	NR	NR	Yes	~~8/14~~MERV-8	NR	72–78/22–26
Hazardous material storage	Negative	2	10	Yes	No	No	~~8/NR~~MERV-8	NR	NR
Laundry, processing room (2.1–5.2.2 [2])	Negative	2	10	Yes	No	No	~~8/NR~~MERV-8	NR	NR
Linen and refuse chute room (2.1–5.4.1.4)	Negative	NR	10	Yes	No	No	~~8/NR~~MERV-8	NR	NR
Nonrefrigerated body-holding room (h)	Negative	NR	10	Yes	No	No	~~13/NR~~MERV-8	NR	70–75/21–24
Regulated waste holding spaces (2.1–5.4.1.3)	Negative	NR	10	Yes	No	No	~~8/NR~~MERV-8	NR	NR
Toilet (2.1–5.2.4.1)	Negative	NR	10	Yes	No	Yes	~~8/NR~~MERV-8	NR	NR
SUPPORT AREAS FOR NURSING UNITS AND OTHER PATIENT CARE AREAS									
Clean supply room (2.1–2.6.9.2)	Positive	NR	NR	NR	NR	Yes	~~8/14~~MERV-8	NR	NR
Clean workroom (2.1–2.6.9.1)	Positive	2	NR	NR	NR	Yes	~~8/14~~MERV-8	NR	NR
Soiled workroom or soiled holding (2.1–2.6.10)	Negative	2	10	Yes	No	No	~~8/14~~MERV-8	NR	NR

Note: NR = no requirement

Normative Notes for Table 7.1:

[. . .]

b. Pharmacy compounding areas may have additional air change~~,~~ and differential pressure~~, and filtering~~ requirements beyond the minimum of this table, depending on the type of pharmacy, the regulatory requirements (which may include adoption of USP-797), the associated level of risk of the work (***Informative Note:*** See USP [2017] in Appendix B), and the equipment used in the spaces. Minimum efficiency of filters for any space where compounding occurs shall be determined by the applicable USP standard (USP 795, USP 797, or USP 800).

[. . .]

cc. Table entries are the minimum filter efficiencies required for the space. Refer to Section 6.4 of this document for further clarification of filtration requirements. ~~The first table entry is the minimum filter efficiency for Filter Bank No. 1. The second table entry (after the slash) is the minimum filter efficiency for Filter Bank No. 2.~~ The minimum efficiency reporting value (MERV) is based on the method of testing described in ANSI/ASHRAE Standard 52.2, *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size* ([ASHRAE 2012] in Informative Appendix B).

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.

hh. See also Section 7.4.1(c).

ii. A minimum MERV-8 filter may be utilized for this space in lieu of a minimum MERV-14 filter if all room air is exhausted directly to the outdoors and the pressure relationship to adjacent areas is kept negative. If a filter rated less than MERV-14 is utilized, the space shall be considered "Negative" with regards to the table and must comply with all other requirements for negative spaces within the standard.

Modify Section 7.2.2 as shown.

7.2.2 Protective Environment (PE) Rooms. Ventilation for PE rooms shall meet the following requirements:

[. . .]

c. Air distribution patterns within the protective environment room shall conform to the following:

1. Supply air diffusers shall be above the patient bed unless it can be demonstrated that such a location is not practical. Diffuser design shall limit air velocity at the patient bed to reduce patient discomfort. (See ASHRAE Standard 55 [2013] in Informative Appendix B.)
2. Return/exhaust grilles or registers shall be located near the patient room door.
3. HEPA filters shall be located in the air terminal device.

Exception to 7.2.2(c): For common systems serving more than one protective environment space and where more than 75% of airflow serves protective environment spaces, HEPA filters may be located in the air-handling unit in a position downstream of all cooling and heating equipment.

[. . .]

Modify Section 7.4.1 as shown.

7.4.1 Operating Rooms, Operating/Surgical Cystoscopic Rooms, and Caesarean Delivery 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. wc (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 designated for orthopedic procedures, transplants, neurosurgery, or dedicated burn unit procedures, HEPA filters shall be provided.

[. . .]

Modify Section 8.1(a)(5)(iii) as shown.

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

a. Spaces shall be ventilated according to Table 8.1.

[. . .]

5. For spaces where Table 8.1 permits air to be recirculated by room units, the portion of the minimum total air changes per hour required for a space that is greater than the minimum outdoor air changes per hour required component may be provided by recirculating room HVAC units. Such recirculating room HVAC units shall
   i. not receive nonfiltered, nonconditioned outdoor air;
   ii. serve only a single space; and
   iii. provide a minimum MERV ~~6~~ 8 filter for airflow passing over any surface that is designed to condense water. This filter shall be located upstream of any such cold surface, so that all of the air passing over the cold surface is filtered.

[. . .]

Modify Table 8.1 as shown.

Modify Section 8.3.1 as shown.

Table 8.1 Design Parameters for Outpatient-Specific 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
COMMON SPACES IN OUTPATIENT FACILITIES								
AII anteroom (i) (3.1–3.4.3)	(e)	NR	10	Yes	No	~~7/NR~~MERV-8	NR	NR
AII room (i) (3.1–3.4.2)	Negative	2	12	Yes	No	~~7/NR~~MERV-8	Max 60	70–75/21–24
Bronchoscopy, sputum collection, and pentamidine administration (n)	Negative	2	12	Yes	No	~~7/NR~~MERV-14	NR	68-73/20-23
Clean supply storage (3.1–3.6.9)	Positive	2	4	NR	NR	~~7/NR~~MERV-8	Max 60	72–78/22–26
Emergency waiting rooms	Negative	2	12	Yes (q)	NR	~~7/NR~~MERV-8	Max. 65	70-75/21-24
Environmental services room (3.1–5.5.1)	Negative	NR	10	Yes	No	~~7/NR~~MERV-8	NR	NR
General-purpose examination/observation room (3.1–3.2.2)	NR	2	4	NR	NR	~~7/NR~~MERV-8	Max 60	70–75/21–24
Laboratory testing/work area if in a separate dedicated room (3.1–4.1.2)	Negative	2	6	Yes	NR	~~7/NR~~MERV-8	NR	70–75/21–24
Medical waste holding spaces (3.1–5.4.1.3)	Negative	2	10	Yes	No	~~7/NR~~MERV-8	NR	NR
Medication preparation room programmed to compound sterile preparations (b) (3.1–3.6.6.2)	Positive	2	4	NR	NR	~~7/ HEPA (s)~~ MERV-8	NR	NR
Soiled holding room (3.1–3.6.10)	Negative	2	6	Yes	No	~~7/NR~~MERV-8	NR	72–78/22–26
Special-purpose examination room (3.1–3.2.3)	NR	2	6	NR	NR	~~7/NR~~ MERV-14 (w)	Max 60	70–75/21–24
SPACES SPECIFIC TO PARTICULAR OUTPATIENT FACILITIES						~~7/NR~~		
Cancer treatment area (p) (3.6–3.2)	NR	2	6	NR	NR	~~7/NR~~MERV-8	Max 60	70–75/21–24
Diagnostic imaging waiting area (3.5–6.1.3.2) (g)	Negative	2	12	Yes (q), (r)	NR	~~7/NR~~MERV-8	Max 60	70–75/21–24
ECT procedure room (p) (3.11–3.3.2.2)	NR	2	4	NR	NR	~~7/NR~~MERV-8	Max 60	70–75/21–24
Endoscopy procedure room (h) (3.9–3.2.2)	NR	2	6	NR	No	~~7/NR~~MERV-8	Max 60	68–73/20–23
Freestanding urgent care facility procedure room (3.5–3.2.2)	Positive	2	6	NR	No	~~7/NR~~MERV-8	NR	70–75/21–24
Instrument processing room (3.9–5.1)	Negative	2	10	Yes	No	~~7/NR~~MERV-8 (s)	NR	NR
Office-based procedure room (p) (3.8–3.1)	NR	2	4	NR	NR	~~7/NR~~MERV-8	Max 60	70–75/21–24
Outpatient surgical facility operating room (m), (o) (3.7–3.3)	Positive	4	20	NR	No	~~7/14~~MERV-16 (v)	20–60	68–75/20–24
Outpatient surgical facility procedure room (o), (d) (3.7–3.2)	Positive	3	15	NR	No	~~7/NR~~MERV-14	20–60	70–75/21–24
Postoperative recovery area (3.7–3.4.3)	NR	2	6	NR	No	~~7/NR~~MERV-8	Max 60	70–75/21–24
Postprocedure recovery area (u) (3.9–3.3)	NR	2	2	NR	NR	~~7/NR~~MERV-8	Max 60	70–75/21–24
Preprocedure patient care area (t) (3.9–3.3)	NR	2	2	NR	NR	~~7/NR~~MERV-8	Max 60	70–75/21–24

Note: NR = no requirement

Normative Notes for Table 8.1:

[. . .]

b. Pharmacy compounding areas may have additional air change~~,~~ and differential pressure~~, and filtering~~ requirements beyond the minimum of this table, depending on the type of pharmacy, the regulatory requirements (which may include adoption of USP 797), the associated level of risk of the work **(*Informative Note:*** See USP [2017] in Appendix B), and the equipment used in the spaces. Minimum efficiency of filters for any space where compounding occurs shall be determined by the applicable USP standard (USP 795, USP 797, or USP 800).

[. . .]

s. ~~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. High efficiency particulate air (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 ***Informative Note:*** See IEST [2005] in Appendix B.~~ 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.

[. . .]

v. See also Section 8.4.1(c).

w. A minimum MERV-8 filter may be utilized for this space in lieu of a minimum MERV-14 filter if all room air is exhausted directly to the outdoors and the pressure relationship to adjacent areas is kept negative. If a filter rated less than MERV-14 is utilized, the space shall be considered "Negative" with regards to the table and must comply with all other requirements for negative spaces within the standard.

x. Examination rooms programmed for use by patients with undiagnosed gastrointestinal symptoms, undiagnosed respiratory symptoms, or undiagnosed skin symptoms.

8.3.1 Operating Rooms, Operating/Surgical Cystoscopic Rooms, and Caesarean Delivery 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. wc (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 designated for orthopedic procedures, transplants, neurosurgery, or dedicated burn unit procedures, HEPA filters shall be provided.

[. . .]

Modify Table 9.1 as shown.

Modify Section 11 as shown.

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

Function of Space	Pressure Relationship to Adjacent Areas (f)	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 (m)	Design Relative Humidity (k), %	Design Temperature (l), °F/°C
NURSING HOMES								
AII room (c)	Negative	2	12	Yes	No	~~13/NR~~MERV-14	Max 60	70–75/21–24
AII anteroom (c)	(e)	NR	10	Yes	No	~~13/NR~~MERV-8	NR	NR
Occupational therapy	NR	2	6	NR	NR	~~13/NR~~MERV-8	NR	70–75/21–24
Physical therapy	Negative	2	6	NR	NR	~~13/NR~~MERV-8	NR	70–75/21–24
Resident gathering/activity/dining	NR	4	4	NR	NR	~~13/NR~~MERV-8	NR	70–75/21–24
Resident room	NR	2	2	NR	NR	~~13/NR~~MERV-14	NR	70–75/21–24
Resident unit corridor	NR	NR	4	NR	NR	~~13/NR~~MERV-8	NR	NR
Toilet/bathing room	Negative	NR	10	Yes	No	~~13/NR~~MERV-8	NR	70–75/21–24
ASSISTED LIVING FACILITIES								
Resident gathering/activity/dining	NR	NR	NR	NR	NR	~~7/NR~~MERV-8	NR	NR
Resident room	NR	NR	NR	NR	NR	~~7/NR~~MERV-8	NR	NR
Resident unit corridor	NR	NR	NR	NR	NR	~~7/NR~~MERV-8	NR	NR
Toilet/bathing room	NR	NR	NR	NR	NR	~~7/NR~~MERV-8	NR	NR
HOSPICE FACILITIES								
AII room (c)	Negative	2	12	Yes	No	~~13/NR~~MERV-14	Max 60	70–75/21–24
AII anteroom (c)	(e)	NR	10	Yes	No	~~13/NR~~MERV-8	NR	NR
Resident room	NR	2	2	NR	NR	~~13/NR~~MERV-8	NR	70–75/21–24
Resident unit corridor	NR	NR	4	NR	NR	~~13/NR~~MERV-8	NR	NR
Toilet/bathing room	Negative	NR	10	Yes	No	~~13/NR~~MERV-8	NR	70–75/21–24
RADIOLOGY								
X-ray (diagnostic and treatment)	NR	2	6	NR	NR	~~13/NR~~MERV-8	Max 60	72–78/22–26
SERVICE								
Clean linen storage	Positive	NR	2	NR	NR	~~7/NR~~MERV-8	NR	72–78/22–26
Dietary storage	NR	NR	2	NR	No	~~7/NR~~MERV-8	NR	72–78/22–26
Food preparation center (i)	NR	2	10	NR	No	~~7/NR~~MERV-8	NR	72–78/22–26
Janitor's closet	Negative	NR	10	Yes	No	~~7/NR~~MERV-8	NR	
Laundry, general	Negative	2	10	Yes	No	~~7/NR~~MERV-8	NR	
Linen and trash chute room	Negative	NR	10	Yes	No	~~7/NR~~MERV-8	NR	
Soiled linen sorting and storage	Negative	NR	10	Yes	No	~~7/NR~~MERV-8	NR	
Warewashing	Negative	NR	10	Yes	No	~~7/NR~~MERV-8	NR	
SUPPORT SPACE								
Clean utility	Positive	2	4	NR	NR	~~7/NR~~MERV-8(g)	NR	
Hazardous material storage	Negative	2	10	Yes	No	~~7/NR~~MERV-8	NR	
Soiled utility or soiled holding	Negative	2	10	Yes	No	~~7/NR~~MERV-8	NR	

Note: NR = No requirement

Normative Notes for Table 9.1:

[. . .]

g. ~~Not used.~~ 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.

[. . .]

l. Table entries are the minimum filter efficiencies required for the space. Refer to Section 6.4 of this document for further clarification of filtration requirements. ~~The first table entry is the minimum filter efficiency for Filter Bank No. 1. The second table entry (after the slash) is the minimum filter efficiency for Filter Bank No. 2.~~ The minimum efficiency reporting value (MERV) is based on the method of testing described in ANSI/ASHRAE Standard 52.2 (***Informative Note:*** ASHRAE [2012] in Appendix B).

11. NORMATIVE REFERENCES

14. ISO. 2016. ISO 16890-1, *Air filters for general ventilation—Part 1: Technical specifications, requirements and classification system based upon particulate matter efficiency (ePM)*. Geneva, Switzerland: International Organization for Standardization.

Modify Informative Appendix A as shown.

A1. O&M IN HEALTH CARE FACILITIES

The following operations and maintenance procedures are recommended for health care facilities.

A1.1 Operating Rooms

a. Each operating room should be tested for positive pressure semi-annually or on an effective preventative maintenance schedule.

~~b. When HEPA filters are present within the diffuser of operating rooms, the filter should be replaced based on pressure drop.~~

~~c~~b. Operating and caesarean delivery room ventilation systems shall operate at all times, except during maintenance and conditions requiring shutdown by the building's fire alarm system.

A1.2 Protective Environment (PE) Rooms. PE rooms should remain under positive pressure with respect to all adjoining rooms whenever an immunocompromised patient is present. PE rooms should be tested for positive pressure daily when an immunocompromised patient is present. ~~When HEPA filters are present within the diffuser of protective environment rooms, the filter should be replaced based on pressure drop.~~

A1.3 Airborne Infection Isolation (AII) Rooms. AII rooms should remain under negative pressure relative to all adjoining rooms whenever an infectious patient is present. They should be tested for negative pressure daily whenever an infectious patient is present.

A1.4 Filters. F~~inal f~~ilters and filter frames should be visually inspected for pressure drop and for bypass monthly. ~~Filters should be replaced based on pressure drop with filters that provide the efficiencies specified in Table 6.4.~~ All filters and air cleaning devices shall be replaced or maintained per manufacturer recommendations.

Modify Informative Appendix B as shown.

INFORMATIVE APPENDIX B
INFORMATIVE REFERENCES AND BIBLIOGRAPHY

[. . .]

ASHRAE. ~~2010b~~2016. ANSI/ASHRAE Standard 62.1, *Ventilation for Acceptable Indoor Air Quality*. Atlanta: ASHRAE.

ASHRAE 2016. ANSI/ASHRAE Standard 62.2, *Ventilation and Acceptable Indoor Air Quality in Residential Buildings*. Atlanta: ASHRAE.

Add Informative Appendix C.

(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 C
RECOMMENDED FILTER EFFICIENCIES BY SPACE TYPE

Spaces in Table 7-1 of this standard have filter efficiencies assigned based on Table C-1. This table is provided here for information to allow users to understand the intent of the filter assignments and make engineering judgments on spaces not specifically named in the standard.

Table C-1 Recommended Filter Efficiencies by Space Type

Level	Space Category	Filter Efficiency Recommendations (a)(b)
I	• Primarily exhausted space (e.g., restrooms, janitor's rooms) • Any human-occupied space • Any room, inpatient or outpatient, where a patient stays less than 6 hours including waiting rooms • Laboratories • Resident rooms in assisted living or hospice • Storage of packaged sterile material, clean linen, or pharmaceuticals (c) • Treatment rooms, endoscopy procedure room • Dirty side of decontamination process	MERV 8 (equivalent to ASHRAE 62.1 or Standard 62.2)
II	• Inpatient spaces, including medical-surgical, airborne isolation (d) • Special exam room for suspect airborne cases, emergency department exam rooms (e) • Resident room in a skilled nursing area • Workroom for packing of sterile materials • CT or MRI procedure, interventional radiology (including biopsy), or bronchoscopy • ER procedure or trauma room	MERV14 (f)(g)
III	• Operating room (h)	MERV16 (f)
IV	• Operating room designated for orthopedic, transplants, neurosurgery, or dedicated burn unit procedures • Protective environments, including burn units	HEPA

Notes:

a. Where listed, MERV rating is assumed to be non-degrading
b. Transfer air due to differences in pressure between spaces may be unfiltered.
c. Pharmacy compounding spaces are not covered in this table. Follow <USP>795, <USP> 797, or <USP> 800 as applicable.
d. Does not include recirculated air. Air recirculated in an Airborne Isolation room requires HEPA filters.
e. Air from spaces where suspected airborne cases may be treated or examined should be filtered at level II prior to re-circulation to other spaces. If exhausted, supply air filtration may be level I.
f. Minimum MERV rating of the highest efficiency filter in the air stream.
g. Filter efficiency if supply air is used; Not intended to exclude natural ventilation if otherwise allowed.
h. An optional risk assessment, with the user group may indicate a need to increase from Level III to Level IV.

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

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

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

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