ASHRAE 170 Quick-Reference Card

Table 7-1 Headline Ventilation, Pressure & Air-Change Requirements

Current version — Oct 31, 2026. Update history: https://healthcarefacilityhub.org/healthcare-hvac-design-ashrae-170-ventilation-pressure-air-changes/ — Grounded strictly in ANSI/ASHRAE/ASHE Standard 170 and FGI Guidelines.

1. TABLE 7-1 HEADLINE NUMERICAL DESIGN MATRIX (HOSPITAL FACILITIES)

Space Function (Table 7-1)	Pressure Rel.	Min. Outdoor ACH	Min. Total ACH	Exhaust Requirement	Filtration / Terminal Notes
General Operating Room (Class B)	**Positive (+)**	4	20	Recirculation permitted	MERV 8 + 14 central; non-aspirating laminar flow array
Specialty Operating Room (Ortho, Neuro, Transplant)	**Positive (+)**	4	20	Recirculation permitted	Terminal HEPA (99.97% @ 0.3 µm) supply diffusers required
Airborne Infection Isolation Room (AIIR)	**Negative (-)**	2	12	100% direct to outdoors	No recirculation to other spaces; continuous monitor & alarm
Protective Environment (PE)	**Positive (+)**	2	12	Recirculation permitted	Terminal HEPA supply diffusers; tight architectural envelope
Emergency Dept. Treatment / Exam	Neutral (±)	2	6	Recirculation permitted	Standard 2-stage filtration (MERV 8 primary + 14 secondary)
Emergency Dept. Triage Area	**Negative (-)**	2	12	100% direct to outdoors	Rapid pathogen containment at facility intake point
Emergency Dept. Waiting Area	**Negative (-)**	2	12	100% direct to outdoors	Negative to building corridors; high bioaerosol dilution
General Hospital Waiting Rooms	Neutral (±)	1	4	Recirculation permitted	Never over-ventilate at 20 ACH OR rates; balance to table row
SPD — Decontamination Room	**Negative (-)**	2	6	100% direct to outdoors	Pathogen containment; negative cascade from clean assembly
SPD — Clean Assembly & Pack	**Positive (+)**	2	4	Recirculation permitted	Positive to decontamination; protects packaged instruments
SPD — Sterile Storage Area	**Positive (+)**	2	4	Recirculation permitted	Strictly positive to all adjacent spaces; preserves package wrap

Reading Table 7-1 Air Change Logic

- **Outdoor ACH vs Total ACH:** Total ACH governs room supply volume and internal mixing; Outdoor ACH governs fresh outside air intake for anesthetic dilution and odor control.
- **Formula:** $\text{Total ACH} = (\text{Supply CFM} \times 60) / \text{Room Volume (cu ft)}$.
- **Economizer Trap:** A room can meet 20 Total ACH yet violate code if the AHU outdoor air damper schedule fails to deliver the required 4 Outdoor ACH.

The 0.01 in. w.g. (2.5 Pa) Pressure Rule

- **Minimum Differential:** Standard 170 enforces a design differential of at least **0.01 in. w.g. (2.5 Pa)** across closed doors where directional airflow is required.
- **Positive Rooms (+):** Protects sterile field / immunocompromised patients by forcing conditioned clean air outward into adjoining corridors.
- **Negative Rooms (-):** Traps airborne contaminants / bioaerosols within the space for dedicated exterior exhaust.

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Operational Verification, Pressure Differentials, and Survey Readiness

2. ENVIRONMENTAL ENVELOPES, FILTRATION & SETBACK RULES

Filtration Infrastructure (Standard 52.2)

- **Two-Stage Central Filtration:** MERV 8 pre-filters upstream of cooling coils; MERV 14 final filters downstream of supply fans for general inpatient care.
- **Terminal HEPA (99.97% @ 0.3 µm):** Mandated for Protective Environments (PE) and specialty surgical suites (orthopedic implant, neurosurgery, organ transplant).
- **General OR Myth:** Standard 170 does NOT mandate ceiling HEPA for general Class B ORs. Misapplied HEPA adds static pressure resistance and maintenance cost without code basis.

Temperature, Humidity & Setback Caution

- **Thermal Comfort Bands:** Operating rooms: 65°F–75°F (clinically driven down to 60°F or cooler). General patient spaces: 68°F–75°F.
- **Design Relative Humidity:** 20% to 60% RH. Lower bounds (<20%) dry patient mucociliary barriers and increase ESD risk. Upper bounds (>60%) foster mold and compromise sterile barrier wraps.
- **Unoccupied Setback:** Permitted in ORs only if directional positive pressure is continuously maintained. Never throttle airflow to zero or invert room pressure.

3. CRITICAL SPACE DIFFERENTIATION & COMMON FIELD PITFALLS

Compliance Focus	Standard 170 Mandate	Common Survey Trap / Misconception
AIIR vs Construction Containment	Permanent licensed negative isolation room: 12 ACH, sealed envelope, dedicated exterior exhaust, visual pressure alarm.	**Trap:** Confusing temporary ICRA containment (HEPA negative scrubbers) with permanent AIIR compliance.
Specialty vs General OR	Class B general ORs rely on MERV 8 + 14 and 20 ACH. Specialty suites require terminal HEPA and specific laminar array size.	**Trap:** Labeling every minor procedure room an OR, incurring excessive fan energy and airflow imbalances.
Lobby / Waiting Ventilation	Public lobbies require 4 ACH; ED waiting requires 12 ACH negative to corridors to mitigate contagious walk-ins.	**Trap:** Over-ventilating lobbies at 20 ACH or failing to maintain negative pressure in ED triage/waiting zones.
Mixed System Split: 170 vs 62.1	When an AHU serves both healthcare (170) and administrative (62.1) areas, commissioning must calculate and prove the OA split.	**Trap:** Testing total supply flow at terminal diffusers while failing to prove minimum system outdoor air fraction.

4. SURVEYOR READINESS: 8-STEP PHYSICAL VERIFICATION PROTOCOL

- **1. Identify Enforced Edition:** Verify whether state AHJ adopts FGI 2018, 2022, or 2026 (incorporating 170-2017, 2021, or 2025).
- **2. Match Space to Drawing:** Compare room nameplate with approved architectural life safety plans and exact Table 7-1 row.
- **3. Check 0.01 in. w.g. Differential:** Verify door closure and magnehelic/digital monitor reading (≥ 0.01 in. w.g. / 2.5 Pa).
- **4. Verify ACH Math:** Ensure $(\text{Supply CFM} \times 60) / \text{Room Volume}$ matches or exceeds the Table 7-1 required total ACH.
- **5. Trace Outdoor Air Delivery:** Confirm AHU minimum OA damper position delivers the required outdoor ACH independent of economizer.
- **6. Test Pressure Alarms:** Functionally test audible and visual pressure alarms outside AIIR and PE rooms.
- **7. Inspect Terminal Diffusers:** Verify laminar unidirectional flow arrays in ORs and airtight HEPA seals in PE rooms.
- **8. Current TAB Certification:** Retain baseline TAB report from certified agency (NEBB, TABB, AABC); rebalance post-renovation.