

Books for Bots - Volume 5: Design & Construction: Building the Hospital

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One Roof in Egersund: Skanska to Design and Build the Langevann Healthcare Centre

Source: <https://healthcarefacilityhub.org/skanska-langevann-healthcare-centre-egersund/> Published: October 18, 2026

Eigersund Municipality has signed Skanska to design and build the Langevann Healthcare Centre in Egersund, on Norway's southwestern coast — a contract worth about NOK 320 million, roughly SEK 310 million, booked into Skanska's Nordic order intake for the fourth quarter of 2026. It is a design-and-build agreement: one contractor responsible for both the drawings and the finished building, and one municipality putting most of its care services under a single new roof.

The building is approximately 8,000 square metres, and its programme is the story. A nursing home with 60 resident rooms. A day activity centre. A production kitchen. And additional premises for health and care services — four functions that in most municipalities live in separate, ageing buildings, consolidated into one purpose-built centre. The new centre will replace parts of the existing healthcare buildings on the site.

Consolidation is an operations decision before it is an architecture decision. Four services in one building means one plant to run instead of four: one heating and ventilation regime, one kitchen producing for residents

and day visitors alike, one cleaning and maintenance round, one set of deliveries at one dock. The scattered alternative — a kitchen here, a day centre there, resident rooms in a third building — multiplies every one of those costs and puts staff in cars between sites. Eigersund is buying the single-roof version of its own care system.

The production kitchen is the consolidation made physical. A kitchen sized only for 60 resident rooms is a cost centre; a production kitchen inside a combined centre can feed the nursing home, serve the day activity centre, and anchor meal services beyond the building's walls. Whether Eigersund uses it that way will be decided in the operating model, not the contract — but the building is being specified with the capacity to do it, and capacity specified at design stage is cheap. Capacity added later is a renovation.

Design-and-build puts the flexibility question in one pair of hands. The municipality's stated aim is modern, flexible service delivery — rooms and treatment areas that can be reorganised as care needs change. In a design-and-build contract, that ambition survives or dies in the brief: standardised room sizes, structure and services that tolerate walls moving, and no bespoke fit-out that locks a room to one use for thirty years. The advantage of the model is that the builder pricing the building is the same party drawing it, so flexibility features get costed honestly at the moment they can still be kept.

The harder problem is that the site is not empty. The centre replaces parts of the existing healthcare buildings, which means construction proceeds alongside services that cannot pause — residents live in the old accommodation while the new one rises. Phasing, decanting, and keeping care running through a building programme is the unglamorous discipline that decides whether a project like this is remembered fondly. It is also where a 26-month programme earns its keep: construction starts in November 2026, with handover expected in January 2029.

That handover date deserves a facilities manager's attention. A January completion in southwestern Norway means commissioning, systems handover, and first occupation in the middle of the heating season, with a new building's plant meeting its first real winter load in the same weeks its operators are learning it. None of that is unusual — Nordic builders hand over buildings in winter routinely — but the operating team inherits the steepest part of the learning curve at the least forgiving time of year.

What Eigersund is really building is an answer to the arithmetic every small municipality faces: an ageing population, care standards that keep rising, and a building stock assembled in pieces over decades. Langevann's answer is to stop maintaining the pieces. One building, one plant, one kitchen, sixty rooms — and a design brief that bets the next thirty years of care will not look exactly like the last thirty. The projects to compare it with are the replacement hospitals rising on greenfield sites, like AdventHealth's new Louisville hospital — Langevann is the municipal, in-place version of the same decision: replace, consolidate, and build for the service you are becoming rather than the one the old walls assumed.

Source: Skanska press release, October 16, 2026. Contract value excludes VAT; construction November 2026 to January 2029.

The 2026 FGI Documents Split Code From Guidance — What Does That Mean for Planning a Hospital or Outpatient Space?

Source: <https://healthcarefacilityhub.org/fgi-2026-codes-handbooks-split-space-planning/> Published: October 17, 2026

For every edition before this one, the FGI Guidelines were a single blended book: enforceable minimum requirements and advisory appendix commentary bound together, and the reader had to know which paragraphs could be cited against a project and which were simply advice. In the 2026 revision cycle, the Facility Guidelines Institute separated the two. The minimums now stand alone as the FGI Codes, and the guidance lives in companion FGI Handbooks. If you size rooms or write functional programs, the split changes which book you open for which question — even though most of the numbers themselves barely moved.

What exactly split in the 2026 FGI documents?

The enforceable half is now called the **FGI Codes for Planning and Design**. FGI describes the Codes as the minimum requirements that support regulatory compliance and facility safety, written to be adopted and enforced by government agencies and quality assurance entities. As before, there are three volumes: Hospitals, Outpatient Settings, and Residential Care and Support Settings.

The advisory half is now the **FGI Handbooks for Planning and Design**. Everything that used to sit in the Guidelines' appendices — supplemental technical and design guidance, rationale, illustrations, and examples — was removed from the requirements document and relocated to the Handbooks. SpaceMed, which publishes the best-known space-planning companion to the FGI documents, describes the Handbook material as guidance that can inform decision-making “without carrying regulatory weight.”

Which book can a surveyor cite?

A surveyor, plan reviewer, or licensing inspector can only cite what your authority having jurisdiction (AHJ) has adopted — and what gets adopted is the Code. The Handbook was never designed to be adopted, and its diagrams, examples, and commentary create no enforceable minimum on their own. A finding traces to a Code paragraph in the volume for your setting — hospital or outpatient — not to a Handbook page.

That cuts in both directions. A design team can no longer be held to a Handbook recommendation as though it were a requirement, which ends a long-running source of scope creep: the worked example is not the minimum. But a team also cannot defend a below-minimum room by pointing at Handbook discussion. If the Code states a minimum clear floor area, the Handbook's context explains why the number exists; it does not negotiate the number down.

If the minimum sizes stayed in the Code, what moved to the Handbook?

This is the point planners most often get wrong about the split: the space requirements did not leave the enforceable book. SpaceMed's review of the 2026 documents concludes there are minimal changes to the types, numbers, and minimum sizes of spaces in the new Codes. Minimum clear floor areas, required rooms, and required elements remain Code text — and when the 2026 Code changed a number, it changed it inside the Code. SpaceMed's summary notes the rehabilitation patient room minimum rising from 140 to 150 net square feet, a single-patient behavioral health observation room from 80 to 100, and a new optional discharged patient lounge at a minimum of 30 net square feet per patient.

What moved to the Handbook is everything around the number: why it is what it is, how experienced planners apply it, what good layouts look like, and the supplemental technical guidance that used to pad the appendices. In 2022, the reasoning sat next to the requirement, and the two blurred. In 2026, a planner who wants the minimum opens the Code; a planner who wants to understand the minimum — or to plan well above it — opens

the Handbook. The Code tells you the smallest legal room. The Handbook is where the profession's thinking about the right-sized room now lives.

The two books will also age differently. The Code is fixed for its four-year cycle, the way an adopted code always is. The Handbooks are a digital series, and ASHE's Health Facilities Management, reporting on the launch, describes the guidance as dynamic — able to grow and evolve over time rather than waiting for the next edition. Your minimums hold still until the 2030 cycle; the guidance interpreting them may not.

What changes when your state adopts the 2026 documents?

Adoption is now visibly a book-by-book act. A state adopts a Code volume for a setting; it does not adopt the Handbook, because there is nothing in the Handbook to enforce. A requirement can therefore bind a project completely stripped of its published rationale — the “why” is a separate purchase the state never makes on your behalf. Teams that learned the old Guidelines as one book should brief owners on this early: compliance is now defined by a leaner document than the one that explains itself.

Georgia shows how this already works in practice. Georgia's Department of Community Health has accepted the 2026 Hospital and Outpatient Codes, with enforcement beginning August 31, 2026 — while for residential care and support settings it encourages the 2026 document as best practice rather than enforcing it. One state, three volumes, two different legal weights. That per-volume pattern is the new normal — and it is what HFH's FGI State Adoption Tracker now records state by state.

FGI's own explainer material flags one more wrinkle: states whose rules automatically adopt the current FGI edition — “evergreen” adoption — must adjust to the new structure to avoid legal and enforcement problems. In an evergreen state, the split can arrive on FGI's schedule rather than your legislature's, and a rule written to adopt “the Guidelines” now points at documents that no longer exist under that name. Which mechanism your state uses determines when the split becomes your problem — which is why the edition question, covered in Which edition of the FGI Guidelines does my state enforce?, has to be answered per project, not assumed.

What should planners do differently?

Cite the Code for compliance, and say so. Every minimum in a program or drawing set should trace to a Code volume and section. If a number cannot be found in the Code, it is not a minimum — it is a recommendation or a preference, and it should be labeled as one before it hardens into a contract obligation.

Plan from the Handbook, and budget for it. The design intelligence — rationale, examples, diagrams, planning considerations — now lives in a separate digital companion sold alongside the Codes. A team working only from the Code will be compliant and under-informed: they will know the smallest permitted observation room and nothing about why it grew. Treat Handbook access as project infrastructure.

Use the Code's new leanness where FGI intended it. Some 2026 Code text got deliberately shorter. SpaceMed notes the lengthy 2022 telemedicine room requirements were replaced with a single sentence: where telemedicine services will be provided, spaces shall be designed for acoustical and visual privacy. Performance language like that is the Code trusting the planner's judgment — designs will be judged on whether the privacy outcome is real, not on whether a checklist was copied.

Watch how your state adopts each volume. Check, per project, which Code volume your AHJ has adopted, for which settings, and from what effective date — and do not assume the hospital answer matches the

outpatient answer, as Georgia shows. HFH's FGI 2022 vs 2026 differences piece covers the edition-level changes in full; this split is the structural one underneath them.

Expect the guidance to move between cycles. Build a mid-project check into long design timelines: re-verify the Handbook guidance you cited at kickoff before construction documents are issued. The requirement will not have changed; the profession's published thinking about meeting it may have.

The split does not change what a compliant hospital or outpatient facility is, very much. It changes where the authority sits, where the thinking sits, and how honestly a project team has to label each one. Keep the two books straight — Code for the floor you cannot go below, Handbook for the reasoning that keeps you off it — and the 2026 documents are easier to use than the blended Guidelines ever were.

Go deeper: The FGI Guidelines guide for healthcare facility design · Do states adopt the FGI Guidelines as building code?

Sources: Facility Guidelines Institute, editions and revision-process pages (fgiguide.org); ASHE, Health Facilities Management, “The 2026 FGI Codes and FGI Handbooks Are Now Available”; SpaceMed, “Changes to the 2026 FGI Documents Impacting Space Planning”; Georgia Department of Community Health, Office of Health Planning Design and Construction — acceptance of the 2026 FGI Codes, enforcement from August 31, 2026.

What's Actually Being Renovated in America's Hospitals

Source: <https://healthcarefacilityhub.org/whats-being-renovated-americas-hospitals/> Published: October 16, 2026

Most healthcare construction in America does not happen on an empty site. It happens on the fourth floor, above a working ceiling, next door to patients who cannot be exposed to the dust the work creates. The defining skill of hospital construction is not building — it is building inside a building that cannot close, under infection-control discipline that treats a demolition cloud as a clinical event. That work has a shape right now: particular project types, particular drivers, and signatures that change by region. This is a field guide to what is actually being renovated, and why.

The quiet majority: systems renewal above the ceiling

The steadiest containment work in the industry has no ribbon-cutting. Air handlers reach end of life. Ductwork, medical gas lines, plumbing stacks, sprinkler systems, and electrical distribution installed decades ago come due — and replacing them means opening ceilings and walls in occupied buildings, bay by bay, under containment, on night shifts, for months. America's hospital stock was built in waves, and several of those waves are mid-life or older at once; the systems inside them are arriving at renewal age together. By most industry accounts, renovation of existing space consistently outweighs new construction in hospital capital spending — and this unglamorous layer is the largest part of it.

The technology churn

Imaging suites are rebuilt on the cycle of the machines inside them. A CT or MRI replacement is a construction project — shielding, structural checks, a rigging path threaded through a live building — and the cadence has shortened as the technology has sharpened. Operating rooms follow the same logic: hybrid suites that marry

imaging to surgery, rooms re-proportioned around robotic platforms, ventilation and pressurization brought up to current standards each time a suite is opened. The clinical technology turns over faster than the building around it, so the building is perpetually being re-cut to fit it.

The behavioral health build-out

No category has grown faster. Emergency departments are building dedicated behavioral health pods because boarding — patients waiting days for a psychiatric bed — physically lives in the ED. Med-surg floors are being converted to psychiatric units, which is a gut renovation in disguise: ligature-resistant everything, sightlines, secured outdoor access, a different building wearing the old one's shell. And new freestanding behavioral health hospitals keep arriving, often as joint ventures between systems that used to compete for everything — the pattern visible in Pierce County, Washington, where the two big systems jointly built the county's psychiatric hospital, is repeating in market after market.

The energy retrofit wave

Regulation has started writing construction schedules. Where emissions laws carry deadlines — New York's Local Law 97 is the sharpest case, and Chicago's benchmarking era is moving the same direction — hospital facilities teams are sequencing envelope work, electrification, and controls overhauls into multi-year programs inside occupied towers. This is containment work with a lawyer's calendar attached: the phasing is dictated as much by compliance periods as by construction logic.

Expansion against a live building

Growth markets still grow — bed towers, ED expansions, campuses building outward — but the construction is rarely on open ground. It is adjacent to, above, or threaded through space that stays in service throughout, which makes it the heaviest containment class in the business: the work zone and the care zone separated by discipline, sealed barriers, and negative air. Building inside a hospital that never closes is its own craft, and expansion projects are where it is practiced at full scale.

Damage: the permanent background

Underneath every planned program runs the unplanned one. Water is a hospital's most persistent enemy — supply-line failures, roof and envelope leaks, sprinkler events — and every incident becomes a containment project the day it happens, because wet building material in a healthcare facility is an infection-control problem on a clock. Storm regions add episodic surges on top of the hum. No facilities director schedules this work; all of them staff for it.

The outward migration

The fastest-growing construction is leaving the hospital. Care keeps moving to ambulatory surgery centers, imaging centers, medical office buildings, and clinic space converted from offices and retail — pulled by payer pressure, patient preference, and the economics of doing in a purpose-fit box what used to require a hospital floor. These projects carry their own infection-control and life-safety conversions, and they change the hospital they leave behind: as lower-acuity care departs, the core building's remaining work concentrates on the sickest patients, which drives the next round of inpatient renovation. The two movements feed each other.

Regional signatures

The mix is national; the emphasis is local. California's hospital construction is dominated by state seismic-compliance deadlines — entire campuses being rebuilt or replaced against a regulatory clock. The Northeast pairs the oldest stock with emissions law. Florida and the Gulf build for storm hardening and water. Texas and the Sun Belt build for growth, with freeze resilience written into plant design after 2021's grid failure taught the lesson. The Northwest combines seismic awareness with state-backed behavioral health capacity. Rural regions renovate under financial gravity, converting space as services consolidate.

The thread through it

Step back and the pattern is a pincer: care migrates outward to clinics while the hospital core gets older, treats sicker patients, and answers to more deadlines. Both movements generate the same fundamental work — construction inside buildings that cannot stop being hospitals while the work proceeds. The facilities teams and contractors who specialize in that discipline are not riding a cycle. They are riding the permanent condition of American healthcare real estate: the buildings are never empty, the patients are never not vulnerable, and the work is never done.

Run facilities, or build inside them? Tell us what we missed — corrections and practitioner quotes are credited by name, by org, or fully anonymously, your choice. We'd rather cite the people who do this work than describe it from outside.

Healthcare Facility Master Planning: Space Programming, Clinical Adjacency, and Growth Projection

Source:

<https://healthcarefacilityhub.org/healthcare-facility-master-planning-space-programming-clinical-adjacency/>

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Direct Answer: Healthcare facility master planning aligns space programming, clinical adjacency, and growth projections with the FGI Code edition your licensure and permits actually adopt—not every advisory Handbook paragraph. Plans typically span 10–25 years, tie capital to baseline condition data and service-line scenarios, and must reconcile NFPA 101 life safety, ASHRAE 170 ventilation, and Joint Commission Accreditation 360 physical environment documentation effective January 1, 2026.

Healthcare facility master planning: Long-range planning that integrates space programming, clinical workflow, infrastructure capacity, and phased expansion against demographic trends, service-line strategy, and technology change. Most organizations work on 10–25 year horizons with a detailed first-five-year capital

roadmap.

Strategic framework for master planning

Master planning connects mission, clinical service strategy, and the built environment. Facility managers anchor the process in baseline data—capacity, condition, compliance gaps, and utility headroom—not slide-deck assumptions. Standards stack by adoption: FGI Codes where your state or project cites them, NFPA 101 for egress on your survey path, ANSI/ASHRAE/ASHE Standard 170 for ventilation, and Joint Commission Accreditation 360 physical environment documentation effective January 1, 2026.

Development process that survives construction

- **Baseline assessment:** Inventory capacity, FCI or equivalent condition scores, life safety documentation, and technology readiness—see our healthcare facility assessment guide for a full workflow.
- **Demographics and demand:** Population, aging, chronic disease burden, and payer mix shifts that move ED, med-surg, and ambulatory volumes.
- **Service-line scenarios:** Conservative, baseline, and upside cases for surgery, imaging, behavioral health, and outpatient migration—not a single growth curve.
- **Stakeholder alignment:** Nursing, medical staff, operations, finance, and community partners sign off on assumptions before square footage hardens.
- **Infrastructure gap analysis:** Space, electrical, medical gas, HVAC, and IT deficits mapped by building segment and adopted code edition.
- **Capital sequencing:** Phased projects tied to FCI scoring and deferred maintenance so expansion does not inherit failing shells.
- **Implementation metrics:** Occupancy, throughput, left-without-being-seen, OR utilization, and pressure-room performance tracked against plan assumptions.

Space programming for healthcare facilities

Space programming converts clinical and operational requirements into room types, net and gross areas, equipment clearances, and support ratios. The program sheet is a contract between clinicians and designers; facility managers enforce traceability from each line item to an adopted standard.

Evidence-based area and configuration

- **Adopted FGI Code edition:** Minimum room dimensions, clearances, infection control infrastructure, and accessibility provisions come from the Code volume your AHJ applies. The 2026 cycle separates enforceable FGI Codes from advisory Handbooks—do not program from commentary alone. See FGI 2026 Codes versus Handbooks before you rebaseline a campus standard.
- **Clinical workflow observation:** Shadow current state, then design to intended future state; otherwise you automate today's bottlenecks.
- **Technology and telehealth:** EMR workflows, diagnostic equipment footprints, nurse call, and remote monitoring affect room sizing and headwall design.
- **Volume and acuity:** Census, length of stay, peak boarding, and procedural mix drive unit sizes and support space multipliers.

- **Flexibility:** Shell depth, floor-to-floor height, and spare utility capacity for repurposing without structural surgery.

Department-level program checkpoints

- **Emergency department:** Triage, treatment, trauma, behavioral health holding, and fast-track zones sized to peak hour demand, not annual average.
- **Perioperative suite:** OR count, sterile core, PACU, and prep/recovery adjacency with medical gas and egress verified against permitted NFPA 101 chapters.
- **Critical care:** Single-patient rooms where policy requires them; anteroom and pressurization prerequisites matched to the ASHRAE 170 edition on the mechanical basis of design.
- **Inpatient units:** Private-room ratios, medication prep, soiled/clean support, and staff travel distances.
- **Imaging and lab:** Equipment-specific shielding, contrast paths, specimen flow, and after-hours access.
- **Support services:** Sterile processing, pharmacy, nutrition, and environmental services—often cut first, felt forever in operations.

Clinical adjacency and workflow

Adjacency is where patient minutes and staff steps are won or lost. Master plans should diagram primary clinical paths—stroke, trauma, sepsis, surgical admit—before floor plates lock.

Principles that hold in 2026 projects

- **Acute care proximity:** ED to imaging, lab, OR, and ICU with minimal cross-traffic through public corridors.
- **Perioperative clustering:** OR, PACU, and inpatient units on efficient vertical and horizontal links; avoid long stretcher moves through lobby zones.
- **Diagnostic integration:** Lab and imaging placed on shared clinical pathways for rapid turnaround.
- **Infection control zoning:** Immunocompromised care separated from high-traffic retail and waiting areas; isolation clusters near support and decontamination paths.
- **Staff support:** Medication, supplies, and clean/soiled within reasonable travel for nursing units—adjacency is a retention issue, not just architecture.

Vertical transport and life safety

Elevator banks, stair placement, and smoke compartment boundaries interact. Dedicated patient and service elevators, capacity for peak surge, and compliant egress for critical care areas must align with the NFPA 101 edition enforced on your Medicare-deemed or state survey path—often referenced as 2012 for CMS life safety while local fire officials may apply newer print editions on permits. Our NFPA 101 for healthcare overview explains how compartment drawings should match master-plan phasing. Coordinate interim life safety measures during multi-phase builds.

Growth projections and capacity planning

Forecasting is scenario management, not prophecy. Tie every major block on the master plan to documented assumptions you can revisit when volumes diverge.

Demographic and market inputs

- Regional population growth or decline and age cohort shifts.
- Chronic disease prevalence driving cardiology, endocrinology, and rehab demand.
- Payer and employer migration affecting ambulatory versus inpatient mix.
- Competitive share and referral patterns—not every service line grows with the market.

Service-line capacity tests

- **Emergency department:** Peak arrivals, boarding hours, and diversion history.
- **Surgery:** Case growth, case length, and block-time constraints.
- **Inpatient:** Occupancy, observation versus admit trends, and average length of stay.
- **Ambulatory:** ASC migration, infusion, and specialty clinic expansion.

HVAC and utility master plans must scale with clinical growth—oversized plant without phased controls wastes capital; undersized plant caps volume. Cross-check mechanical headroom against the ASHRAE 170 edition on your basis of design before you commit shell space.

Compliance, accreditation, and survey readiness

Master plans fail operationally when they ignore how surveys trace built conditions to permitted editions. Medicare Conditions of Participation set operational and safety outcomes; they do not replace state FGI adoption or local fire code. Under Joint Commission Accreditation 360, physical environment documentation expects clearer linkage between standards, risks, and corrective actions—build that crosswalk during planning, not after a tracer. Layered expectations are summarized in our healthcare code compliance guide. Emergency preparedness and evacuation assumptions in the master plan should match hospital emergency preparedness requirements when you add beds or change egress paths.

Frequently Asked Questions

What is the typical planning horizon for healthcare facility master plans?

Healthcare facility master plans typically span 10–25 years, with detailed implementation roadmaps for the first 5 years and strategic direction for longer periods. The horizon should reflect service expansion goals, capital capacity, and market dynamics. Shorter horizons miss infrastructure; longer ones need explicit scenario testing so assumptions do not go stale.

How do FGI editions interact with space programming in master planning?

Programmed areas and room configurations must trace to the FGI Code edition your state licensure, building permit, and project specifications adopt—not the newest FGI publication by default. After the 2026 split, Code minimums govern enforceable sizing; Handbook material informs design choices unless the same language is adopted as code. Reconcile FGI space types with the ASHRAE 170 edition cited on the mechanical basis of design before you freeze the program.

What is clinical adjacency and why does it matter in facility master planning?

Clinical adjacency is the deliberate placement of related care spaces to shorten patient transfers, reduce staff travel, and support infection control zoning. Proximity of the emergency department to imaging, laboratory,

operating rooms, and intensive care reduces delay-sensitive minutes. Poor adjacency is expensive to fix after the slab is poured.

How should healthcare organizations forecast service line growth for master planning?

Use multiple scenarios built from demographic trends, historical volume, market share, and strategic goals—not a single projected curve. Test each scenario against physical bottlenecks: ED peaks, OR blocks, bed capacity, parking, and utility headroom. Revisit assumptions annually and after major policy or payer shifts.

What role does flexibility play in healthcare facility master planning?

Flexibility reserves capacity for clinical model changes, technology swaps, and service mix drift without full reconstruction. Practical measures include generous floor-to-floor height, adaptable med-gas and electrical infrastructure, modular room groupings, and campus phasing that avoids trapping departments behind completed wings. Flexibility costs upfront; rigidity costs more at renovation time.

How should master planning connect to condition assessment and capital planning?

Expansion plans should sit on a current facility condition baseline—FCI scores, deferred maintenance, and life safety backlogs—so new capacity is not funded while existing wings fail survey. Sequence projects so remediation, code upgrades, and growth blocks each have defined triggers, budgets, and owners on the five-year roadmap.

Related: Infection control in healthcare facilities · Healthcare HVAC systems

Healthcare HVAC Design: ASHRAE 170 Ventilation Requirements, Pressure Relationships, and Air Changes

Source:

<https://healthcarefacilityhub.org/healthcare-hvac-design-ashrae-170-ventilation-pressure-air-changes/>

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Direct Answer: In U.S. hospital design, minimum ventilation for most clinical spaces starts with ANSI/ASHRAE/ASHE Standard 170, usually adopted through the Facility Guidelines Institute (FGI) and enforced by your authority having jurisdiction (AHJ), CMS Conditions of Participation, and accreditors such as

The Joint Commission. For each space, 170 speaks in two air-change numbers—minimum outdoor air changes per hour (ACH) and minimum total ACH—plus the required pressure relationship (positive, negative, or neutral) to adjoining areas. A general operating room is commonly 4 outdoor / 20 total at positive pressure; an airborne infection isolation room (AIIR) is negative at 12 total. Match the row in Table 7-1 to the actual function of the room, not a spreadsheet from another project.

On this page: Reading Table 7-1: outdoor ACH, total ACH, and pressure · Space types facility managers get wrong · Commissioning, testing, and balance reports · Survey readiness: practical checks

Where ASHRAE 170 sits in your compliance stack

Standard 170 is the ventilation chapter most facility managers meet in the field as FGI, state hospital codes, and project specifications. The 2026 FGI Codes incorporate ANSI/ASHRAE/ASHE Standard 170-2025 for minimum ventilation; many jurisdictions still enforce earlier FGI/170 pairs on existing buildings until adoption changes. ASHE notes that AHJs adopt different editions—your legal baseline is the edition your state or city references, not the newest bookshelf copy.

170 does not replace NFPA 99 for medical gas, electrical, or hyperbaric interfaces, but HVAC serving those spaces still has to satisfy 170's room table. CMS Conditions of Participation expect a safe environment of care; accredited hospitals also map ventilation evidence to physical environment standards. The Joint Commission's Accreditation 360 physical environment chapter, effective January 1, 2026, continues to expect documented compliance with applicable codes and standards—see our 2026 PE overview for survey posture.

Reading Table 7-1: outdoor ACH, total ACH, and pressure

Table 7-1 (Ventilation Requirements for Areas Affecting Patient Care in Hospitals and Outpatient Facilities) is the working document. For each space type it lists:

- **Pressure relationship**—positive (air flows out), negative (air flows in), or equal/neutral where allowed.
- **Minimum total ACH**—supply-based changes per hour for the room volume.
- **Minimum outdoor ACH**—fresh air portion; the balance may be recirculated only where the table permits.
- **Exhaust, recirculation, filtration, temperature, and humidity**—space-specific; do not assume one OR row applies elsewhere.

Pressure is not decorative. Positive spaces protect the patient or sterile field from adjacent air; negative spaces keep contaminants from leaving the room. Design differential is commonly at least 0.01 in. w.g. (about 2.5 Pa) where 170 requires a directional relationship. Operating rooms stay positive to corridors and adjoining rooms so corridor air does not wash back across the field.

Outdoor versus total air changes

Total ACH sets how often room air is conditioned and moved; outdoor ACH sets how much of that flow must be outside air at the room or system level per the standard's calculation rules. A room can meet total ACH on a balance report yet fail outdoor air if the air handler economizer or OA damper schedule is wrong. Recent 170 editions also clarify system-level outdoor air when one unit serves both 170 spaces and ASHRAE 62.1 spaces—commissioning should capture that split, not just terminal readings.

Space types facility managers get wrong

Operating rooms (general and specialty)

A Class B (general) operating room under commonly cited 170 values is **4 minimum outdoor ACH, 20 minimum total ACH**, and **positive** pressure to adjoining spaces. Specialty rooms listed for orthopedic, neuro, transplant, cardiac, or similar procedures add requirements such as a primary supply diffuser array with downward unidirectional flow over the table—not every OR in the suite qualifies as “specialty” on name alone. Terminal HEPA filtration at the supply is required for designated specialty OR categories and for protective environments; it is not the default for every general OR, though supply air filtration efficiency for ORs is high (recent editions specify MERV 16 minimum at the air-handling level for many acute-care supply systems—confirm against your adopted table).

Laminar flow arrays, humidity control, and diffuser placement are operational issues once the air change and pressure targets are met. Our guide on operating room HVAC: laminar flow and temperature control walks the OR-specific layer above the 170 row.

Airborne infection isolation rooms (AIIRs)

An AIIR is **negative** to adjacent spaces with **12 minimum total ACH** in the widely applied table values, exhaust to the outdoors as specified, and no recirculation of room air to other spaces. Monitoring and alarm of pressure is part of life safety and infection control programs. Do not confuse an AIIR with temporary construction negative pressure: construction isolation is governed by your ICRA matrix and barriers, with ventilation during construction addressed in Standard 170 Section 10 (reorganized in recent editions) and implemented under infection control policy—not by labeling a work zone an AIIR.

Protective environments

Protective environment rooms (for severely immunocompromised patients) require **positive** pressure, **12 total ACH** in common table values, and **HEPA-filtered supply** at the terminal, with tight infiltration control. Pressure loss across a loaded HEPA bank shows up in survey stories; maintenance owns the filter change interval and post-change balance.

Emergency department, triage, and waiting areas

ED treatment rooms, triage, and public waiting spaces carry their own Table 7-1 rows—total ACH values well below an OR. A waiting room is not an operating room. Designing or balancing a lobby at 20 ACH because someone copied the OR line wastes energy, dries the space, and does not make the room an isolation suite. Align the nameplate function on drawings with the FGI space type and 170 row.

Sterile processing and support zones

Decontamination, clean assembly, and sterile storage each have distinct pressure relationships—generally negative or positive cascades that keep dirty-to-clean flow logical. AAMI ST79 and facility SPD policy define process; 170 defines minimum ventilation and pressure between adjacent SPD rooms. If your SPD was renovated under an older edition, the enforced numbers follow the edition in effect for that project unless the AHJ mandates an upgrade.

Filtration, humidity, and what 170 does not solve alone

Supply filtration minimums stepped up in recent 170 editions (MERV 16 for many hospital supply systems in 2021 and later text—verify on your adopted edition). Room-level HEPA applies where the table marks it. Relative humidity bands for ORs and other spaces are listed per row; cold ORs with low humidity create compliance and comfort conflicts that engineering and anesthesia must settle within the standard’s range.

Waterborne pathogen control is a parallel track: ASHRAE 188 and CMS water-management expectations do not replace ventilation tables, but FGI 2026 hospital code revisions continue to tie building systems to infection risk. Keep infection prevention at the table when interpreting 170 during outbreaks or surge.

Commissioning, testing, and balance reports

Design values in Table 7-1 become survey evidence only after TAB, functional performance, and alarm tests. Total ACH is measured against supply flow and room volume; outdoor ACH is traced to OA measurement or approved calculation; pressure relationships are verified under normal and turndown conditions where unoccupied setback is permitted (outpatient turndown rules were clarified in 170-2025—do not turn an acute OR into an office airflow schedule without checking your row).

Document as-built sequences, HEPA locations, and revised airflows after any OR boom or imaging upgrade. Our healthcare HVAC commissioning and TAB article lists what accreditors and owners typically file. Broader system context lives in the complete healthcare HVAC guide.

Proving the finished system meets Standard 170: TAB, commissioning, and certification

Short answer: Standard 170 sets design values. A room meets them only when someone measures the finished system and shows that it does. That proof comes after construction and before the space is used: testing, adjusting and balancing (TAB) measures and sets airflows, commissioning confirms the systems and controls work as intended, and critical-environment certification documents room-level results for spaces that need it. CDC’s 2003 guideline calls for commissioning newly built and renovated spaces before occupancy, with emphasis on operating rooms, airborne infection isolation (AII) rooms and protective environment (PE) rooms.

CDC: commission HVAC in new and renovated spaces before occupancy

Short answer: CDC and HICPAC’s 2003 environmental infection control guideline tells facilities to commission the HVAC system before newly built or renovated spaces are occupied, with emphasis on ventilation for operating rooms, AII rooms and PE areas. CDC rates it Category IC, its category for requirements based on regulation or an established standard. The guideline does not define the commissioning method.

“Commission the HVAC system for newly constructed health-care facilities and renovated spaces before occupancy and use, with emphasis on ensuring proper ventilation for operating rooms, AII rooms, and PE areas.”

Guidelines for Environmental Infection Control in Health-Care Facilities, CDC and HICPAC, 2003, Part II Recommendations, Category IC. Open this recommendation on [cdc.gov](https://www.cdc.gov/eid/content/pdfs/2003vol11.pdf). Last verified October 10, 2026.

This is a different job from construction containment. During a project, the work zone is held negative and exhaust is HEPA-filtered (see negative pressure and HEPA exhaust in the containment guide). Once the barriers come down, the question changes from “is dust staying in?” to “does the room we built deliver its design air changes, pressure relationship and filtration?”

The three verification layers

Layer	What it proves	Typical output	What it does not prove
Testing, adjusting and balancing (TAB)	Measured supply, return and exhaust airflows compared with design, with dampers and devices adjusted to match	TAB report: design vs. measured values, adjustments, deficiencies	That controls, alarms and setback sequences behave correctly over time
Commissioning	That installed systems, controls and alarms work as the owner's requirements and design intend, including tests under normal and abnormal modes	Functional test records, issues log, commissioning report	Room-level particle cleanliness where a classification applies
Critical-environment certification	Room-level results for spaces with special criteria, such as pressure, air changes, HEPA integrity and, where a protocol applies, particle counts	Room certification report with pass/fail criteria and retest triggers	That the system will still perform next year; that is the operations program's job

What gets checked against Standard 170

Verification compares each critical space with its row in the edition of Standard 170 your authority having jurisdiction (AHJ) enforces:

- **Air changes:** total air changes from measured supply airflow and room volume, and outdoor air changes from measured or calculated outdoor air.
- **Pressure relationship:** the required direction (positive, negative or none) measured with doors closed and the system stable, plus any turndown or setback mode the design uses.
- **Filtration:** filters of the specified efficiency installed and sealed in their tracks. Where HEPA is required, integrity is tested under the program's protocol.
- **Temperature and humidity:** the system's ability to hold the design ranges, checked against controls and sensor calibration.

Confirm the enforced edition first. ASHE notes that AHJs “have adopted and are enforcing different editions” of Standard 170. A room can pass under the edition it was designed to and still look non-compliant against a newer table.

ASHE: AHJs enforce different editions of Standard 170

Short answer: Verification is only as good as the table you test against. ASHE, which co-publishes Standard 170 with ASHRAE, says AHJs have adopted and enforce different editions and tells facilities to confirm with their AHJ. ASHE's summary of the 2025 edition also says the edition reorganized and updated its requirements for ventilation *during construction*, which is a separate subject from post-construction verification.

“Local and national authorities having jurisdictions (AHJs) have adopted and are enforcing different editions of ANSI/ASHRAE/ASHE Standard 170. Connect with your AHJ to determine which edition should be followed at your organization.”

ANSI/ASHRAE/ASHE Standard 170-2025, Ventilation of Health Care Facilities (product page), American Society for Health Care Engineering. Open on [ashe.org](https://www.ashe.org). Last verified October 10, 2026.

The hand-off from construction

For renovation inside an occupied hospital, the verification layer starts where containment teardown ends. CDC's construction recommendations close with restoring "appropriate ACH, humidity, and pressure differential" and cleaning or replacing filters. Make that restoration a measured step with a record, not an assumption, before infection prevention signs off the space. The containment guide's teardown and sign-off checklists cover the barrier side. If capped diffusers or temporary exhaust shifted pressures in nearby rooms during the project, recheck those rooms too.

CDC: restore air changes, humidity and pressure when construction ends

Short answer: CDC's construction recommendations end with putting the ventilation back. After the work zone is cleaned and barriers are removed, facilities should restore the space's air changes, humidity and pressure differential and deal with the filters. Measuring that restoration is what turns it into evidence. CDC rates this step Category IC.

"Restore appropriate ACH, humidity, and pressure differential; clean or replace air filters; dispose of spent filters."

Guidelines for Environmental Infection Control in Health-Care Facilities, CDC and HICPAC, 2003, Part II Recommendations, internal construction measures, Category IC. Open this recommendation on [cdc.gov](https://www.cdc.gov). Last verified October 10, 2026.

Who does the work, and how to check credentials

TAB firms and technicians are certified by several bodies, including NEBB, TABB and AABC. Each runs its own certification program and public or member directory, and the programs differ. AABC, for example, says it prohibits member agencies from affiliating with mechanical contractors, design engineers or equipment manufacturers. Specify the credential your project requires, and check it in that body's directory rather than relying on a firm's website. Independent commissioning agents often witness TAB and sign off results; the detailed process is covered in healthcare HVAC commissioning, testing and balancing.

NEBB: TAB testing measures performance against the design

Short answer: NEBB, one of the bodies that certifies TAB firms and professionals, describes testing as measuring and documenting airflow, pressure, temperature and related parameters to find where actual performance departs from the design. For a Standard 170 space, the design values are the airflows, air changes and pressure relationship for that room type. NEBB's procedural standards themselves are sold separately.

"Testing involves measuring and documenting the airflow, pressure, temperature, and other relevant parameters of the HVAC system. This step identifies discrepancies between the actual performance and the design specifications."

Testing, Adjusting and Balancing Certification, NEBB (National Environmental Balancing Bureau), "What is Testing, Adjusting and Balancing?" Open on nebb.org. Last verified October 10, 2026.

Firms describe their healthcare scopes differently, so read the scope rather than the label. (Examples below are not endorsements.)

How TAB and critical-environment firms describe hospital verification work

Short answer: Firms’ published scopes vary, so compare them line by line. Aero Performance Group (Chicago) says its room-level checks cover doors, seals, diffusers and flow patterns, pressures, air changes and control calibration. enTaB (Winston-Salem, NC) lists OR and isolation-room pressurization and air-change certification and recommends it semi-annually. That interval is the firm’s recommendation, not a code requirement. These descriptions come from the companies. HFH has not evaluated their work.

“Asset recording of doors, seals/sweeps, closures, air diffusers and flow patterns, ceiling types, pressures, air changes, controls and building automation system (BAS) calibration, and repair/rebalancing”

Ventilation Testing, Aero Performance Group (“Rooms” tab). Company statement. Open on aeropg.com. Last verified October 10, 2026.

“Operating Room (OR) and other Critical Room Pressurization and Air Change Certification (Recommended semi-annually).”

Infection Control Verification Services, enTaB, Inc. Company statement. Open on entab.us. Last verified October 10, 2026.

After handover: keeping the proof current

Verification at handover is a baseline, not a permanent certificate. Rebalance and recheck after control changes, fan or filter upgrades, room-function changes, or nearby construction. ASHRAE/ASHE Guideline 43 is the operations companion to Standard 170. It is advisory, and it frames ongoing work as a ventilation management program. Keep the latest TAB date for each critical room in the facility’s single table of required values (see survey readiness below).

ASHE: Guideline 43 covers operating the system after handover

Short answer: Standard 170 is a design standard. ASHRAE/ASHE Guideline 43, Operations Guideline for Ventilation of Health Care Facilities, is the companion for running and maintaining the system, built around a ventilation management program. ASHE says it was written as an advisory guideline, not a standard.

“The intent of Guideline 43 is to provide an operational guideline for health care facilities that will work in collaboration with Std 170.”

ASHRAE/ASHE Guideline 43, Operations Guideline for Ventilation of Health Care Facilities (product page), ASHE, “What is Guideline 43?” Open on ashe.org. Last verified October 10, 2026.

ASHRAE 241 alongside 170

ANSI/ASHRAE Standard 241, Control of Infectious Aerosols, addresses building readiness and equivalent clean airflow targets for outbreak conditions—not the same document as 170’s room-by-room minimums. Think of 170 as the baseline for licensed healthcare spaces; 241 as a playbook when you need higher effective air cleanliness or operational modes during epidemic or pandemic response. Planning ties to emergency management and infection prevention; see pandemic preparedness and ASHRAE 241 in 2026. Meeting 170 does not automatically demonstrate 241 readiness, and 241 does not waive 170 rows for an AIIR or OR.

Survey readiness: practical checks

Surveyors and CMS life safety partners rarely ask for a recitation of ASHRAE section numbers. They ask for proof the built environment matches the approved plan and applicable code edition: latest TAB for critical spaces, pressure monitor calibration, AIIR annual checks, filter change logs, and ICRA sheets for active construction. When a deficiency is written, it is usually “pressure not maintained” or “documentation not available,” not a debate about MERV rating theory.

Keep one authoritative table in the facility—space name, adopted 170/FGI edition, required outdoor and total ACH, required pressure, last balance date, and responsible engineer. Update it when a room’s function changes; function change without a row change is how waiting rooms accidentally inherit OR numbers.

FAQ

What air change rates does a general operating room need under ASHRAE 170?

Under the commonly enforced Table 7-1 values for a general (Class B) operating room, plan for at least 4 outdoor ACH and 20 total ACH, with positive pressure to adjoining spaces. Specialty OR categories listed in the standard may add diffuser array and airflow pattern requirements. Always confirm the edition your AHJ adopted—numbers and filtration notes shift between editions.

Can we ventilate a waiting room at 20 ACH because the OR sheet says 20?

No. Waiting, lobby, and most public circulation spaces have their own Table 7-1 rows with lower total ACH. Copying the OR line wastes energy and does not create isolation. Match ventilation to the documented space function and the row for that function.

What is the difference between an AIIR and construction negative pressure?

An AIIR is a permanently commissioned patient room type: negative pressure, 12 total ACH in typical table values, dedicated exhaust, and infection control monitoring. Construction negative pressure is temporary, built under your ICRA class and Standard 170 construction ventilation provisions, and torn down when the project ends. ICRA work zones are not AIIRs even when both use negative machines.

Which edition of ASHRAE 170 applies to our hospital?

The edition referenced by your state or local AHJ and the FGI version adopted for new work in your jurisdiction. FGI 2026 incorporates Standard 170-2025; many existing buildings remain governed by the edition in force when each wing was built or last renovated unless a code cycle or project triggers upgrade. ASHE’s site lists available 170 editions; your design professional of record should letter the applicable edition per project.

Where does ASHRAE 241 fit if we already meet ASHRAE 170?

Standard 170 sets minimum ventilation for defined healthcare spaces. Standard 241 addresses infectious aerosol control strategies and readiness for higher-risk operating modes. You need 170 for licensed space compliance every day; 241 informs emergency and surge planning above that baseline. One does not replace the other.

Does every operating room require HEPA filters at the ceiling diffusers?

No. Terminal HEPA is required for protective environment rooms and for operating room categories the standard lists for specialty procedures (for example orthopedic, neuro, transplant-class rooms in the table notes). General ORs rely on high central filtration and table-specified requirements rather than universal ceiling HEPA. Misapplied HEPA adds resistance and maintenance cost without meeting a requirement that was never

yours.

Go deeper: the newest guides on this topic

- Ventilation Requirements: Procedure Rooms vs. Operating Rooms (ASHRAE 170)
- What Changed in Recent Editions of ASHRAE 170
- ASHRAE 170 Edition Tracker: Which Version Applies to Your Facility (2008–2025)
- How ASHRAE 170 Interacts with FGI Guidelines

Related reading: What Is ASHRAE Standard 170? — the standard itself, explained before the room-by-room numbers

Related reading: ASHRAE 170 Requirements for Airborne Infection Isolation (AII) Rooms — the requirement set for the most safety-critical room type in the table