

BEYOND

SMART CITIES

INDOOR ENVIRONMENTAL QUALITY - GREEN BUILDING TECHNOLOGY TRAINING PROGRAM

FOR GREEN BUILDING AND SUSTAINABILITY SPECIALISTS

KRISHNAJI PAWAR, LEED AP BD+C, GSAS CGP, ISO 14001:2015, GCP

GREEN BUILDING SPECIALIST CURRICULUM

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MINIMUM INDOOR AIR QUALITY PERFORMANCE - PREREQUISITE

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LEARNING OBJECTIVES



Intent of Minimum Indoor Air Quality Performance - Prerequisite

Behind the Intent

Step by Step Guidance

Requirements

Required Documentation

Connection to Ongoing Performance

Terms and Definitions



IEQ - PR - DESIGN

INTENT

To contribute to the comfort and well-being of all building occupants by establishing minimum standards for indoor air quality (IAQ).

POTENTIAL TECHNOLOGIES & STRATEGIES

Intelligent ventilation design is only the first step. Monitoring, as required by this prerequisite, helps maintain IAQ during all stages of a building's operation. Even though occupants may not notice reductions in outdoor air intake or exhaust air, indoor air pollutants begin to build up the moment proper ventilation ceases. The combination of intelligent ventilation design with monitoring provides confidence that occupants enjoy comfort and well-being,

MINIMUM INDOOR AIR QUALITY PERFORMANCE

REQUIREMENTS

For mechanically ventilated spaces, meet the requirements of ASHRAE Standard 62.1-2016, Sections 4, 5.6.2, 6.5, and 7, or a local equivalent, whichever is more stringent. AND Provide outdoor air monitors for all mechanical ventilation systems with outdoor air intake flow greater than 1000 cfm (472 L/s). The monitoring device must be capable of measuring the minimum outdoor air intake flow and be capable of measuring the design minimum outdoor air intake flow with an accuracy of $\pm 10\%$. An alarm must indicate when the outdoor airflow value varies by 15% or more from the setpoint.

IMPLEMENTATION

REQUIRED DOCUMENTATION

Key Considerations: Codes, Model, Field, Test, Data, Controls, Hardware, and Design Goals, Qualities	DESIGN	INSTALL	OPERATE	MAINTENANCE
ASHRAE 62.1-2016, Sections 4, 5.6.2, 6.5, and 7, or a local equivalent, whichever is more stringent				
ASHRAE 62.1-2016, Section 7.2.1.1, and 7.2.1.2				
ASHRAE 62.1-2016, Section 7.2.1.3, and 7.2.1.4				
ASHRAE 62.1-2016, Section 7.2.1.5, and 7.2.1.6				
ASHRAE 62.1-2016, Section 7.2.1.7, and 7.2.1.8				
ASHRAE 62.1-2016, Section 7.2.1.9, and 7.2.1.10				
ASHRAE 62.1-2016, Section 7.2.1.11, and 7.2.1.12				
ASHRAE 62.1-2016, Section 7.2.1.13, and 7.2.1.14				
ASHRAE 62.1-2016, Section 7.2.1.15, and 7.2.1.16				
ASHRAE 62.1-2016, Section 7.2.1.17, and 7.2.1.18				
ASHRAE 62.1-2016, Section 7.2.1.19, and 7.2.1.20				
ASHRAE 62.1-2016, Section 7.2.1.21, and 7.2.1.22				
ASHRAE 62.1-2016, Section 7.2.1.23, and 7.2.1.24				
ASHRAE 62.1-2016, Section 7.2.1.25, and 7.2.1.26				
ASHRAE 62.1-2016, Section 7.2.1.27, and 7.2.1.28				
ASHRAE 62.1-2016, Section 7.2.1.29, and 7.2.1.30				
ASHRAE 62.1-2016, Section 7.2.1.31, and 7.2.1.32				
ASHRAE 62.1-2016, Section 7.2.1.33, and 7.2.1.34				
ASHRAE 62.1-2016, Section 7.2.1.35, and 7.2.1.36				
ASHRAE 62.1-2016, Section 7.2.1.37, and 7.2.1.38				
ASHRAE 62.1-2016, Section 7.2.1.39, and 7.2.1.40				
ASHRAE 62.1-2016, Section 7.2.1.41, and 7.2.1.42				
ASHRAE 62.1-2016, Section 7.2.1.43, and 7.2.1.44				
ASHRAE 62.1-2016, Section 7.2.1.45, and 7.2.1.46				
ASHRAE 62.1-2016, Section 7.2.1.47, and 7.2.1.48				
ASHRAE 62.1-2016, Section 7.2.1.49, and 7.2.1.50				
ASHRAE 62.1-2016, Section 7.2.1.51, and 7.2.1.52				
ASHRAE 62.1-2016, Section 7.2.1.53, and 7.2.1.54				
ASHRAE 62.1-2016, Section 7.2.1.55, and 7.2.1.56				
ASHRAE 62.1-2016, Section 7.2.1.57, and 7.2.1.58				
ASHRAE 62.1-2016, Section 7.2.1.59, and 7.2.1.60				
ASHRAE 62.1-2016, Section 7.2.1.61, and 7.2.1.62				
ASHRAE 62.1-2016, Section 7.2.1.63, and 7.2.1.64				
ASHRAE 62.1-2016, Section 7.2.1.65, and 7.2.1.66				
ASHRAE 62.1-2016, Section 7.2.1.67, and 7.2.1.68				
ASHRAE 62.1-2016, Section 7.2.1.69, and 7.2.1.70				
ASHRAE 62.1-2016, Section 7.2.1.71, and 7.2.1.72				
ASHRAE 62.1-2016, Section 7.2.1.73, and 7.2.1.74				
ASHRAE 62.1-2016, Section 7.2.1.75, and 7.2.1.76				
ASHRAE 62.1-2016, Section 7.2.1.77, and 7.2.1.78				
ASHRAE 62.1-2016, Section 7.2.1.79, and 7.2.1.80				
ASHRAE 62.1-2016, Section 7.2.1.81, and 7.2.1.82				
ASHRAE 62.1-2016, Section 7.2.1.83, and 7.2.1.84				
ASHRAE 62.1-2016, Section 7.2.1.85, and 7.2.1.86				
ASHRAE 62.1-2016, Section 7.2.1.87, and 7.2.1.88				
ASHRAE 62.1-2016, Section 7.2.1.89, and 7.2.1.90				
ASHRAE 62.1-2016, Section 7.2.1.91, and 7.2.1.92				
ASHRAE 62.1-2016, Section 7.2.1.93, and 7.2.1.94				
ASHRAE 62.1-2016, Section 7.2.1.95, and 7.2.1.96				
ASHRAE 62.1-2016, Section 7.2.1.97, and 7.2.1.98				
ASHRAE 62.1-2016, Section 7.2.1.99, and 7.2.1.100				

REQUIREMENTS

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IMPLEMENTATION

[illegible]

BEHIND THE INTENT

By diluting pollutants created by a building's occupants and other contaminant sources, ventilation contributes to the occupants' comfort and well-being. The exact connections between ventilation rates and occupants' health are still being researched, but a multidisciplinary scientific review of the current state of knowledge shows some strong associations. Maintaining good indoor air quality (IAQ) depends on controlling pollutant sources, removing contaminants from outdoor air, and supplying at least some outdoor air, among other factors. The standards referenced in this prerequisite outline well-tested methods for determining the amount of outdoor air each type of space requires. These standards were chosen because they strike a balance between providing fresh air and maintaining energy efficiency.

Different kinds of occupants, activities, and equipment in a building will make for different IAQ parameters, so requirements vary both by space type in a building and by project type. For example, residential projects must meet additional prescriptive requirements that protect occupants from indoor contaminants, such as combustion byproducts and radon, and health care facilities have more stringent ventilation and space pressurization requirements to prevent cross-contamination.

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STEP-BY-STEP GUIDANCE



Healthcare projects, see [Further Explanation, Rating System Variations](#). ➞

STEP 1. EVALUATE OUTDOOR AIR QUALITY

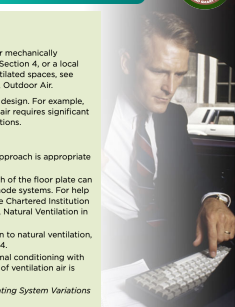
Investigate local outdoor air quality at the project location. If pursuing Option 1 for mechanically ventilated spaces, or using naturally ventilated spaces, follow ASHRAE 62.1-2010, Section 4, or a local equivalent, whichever is more stringent. If pursuing Option 2 for mechanically ventilated spaces, see Comité Européen de Normalisation (CEN) Standard EN 13778-2007, Section 6.2.3, *Outdoor Air*.

Use the results of this analysis to inform ventilation strategy selection and system design. For example, natural ventilation may not be appropriate in high-pollution areas, where outdoor air requires significant filtration. Outdoor air quality may affect mechanical equipment filtration specifications.

STEP 2. SELECT VENTILATION STRATEGY

Determine whether mechanical ventilation, natural ventilation, or a mixed-mode approach is appropriate for the project.

- Consider how the building's form, location, orientation, programming, and depth of the floor plate can create opportunities for low-energy, high-quality natural ventilation or mixed-mode systems. For help in determining whether natural ventilation is feasible for a building or space, see *Chartered Institution of Building Services Engineers (CIBSE) Applications Manual AH10*, March 2009, *Natural Ventilation in Non-Domestic Buildings*, Figure 2.8 (flow chart).
- ASHRAE Standard 62.1-2010 requires mechanical ventilation systems in addition to natural ventilation, unless specific exceptions are met. See ASHRAE Standard 62.1-2010, Section 6.4.
- If mechanical ventilation is preferred, consider separating ventilation from thermal conditioning with a dedicated outdoor air system. These systems ensure that the correct amount of ventilation air is provided while minimizing overventilation and reducing energy consumption.
- Core and Shell, Healthcare, and residential projects see [Further Explanation, Rating System Variations and Project Type Variations](#). ➞



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STEP-BY-STEP GUIDANCE +

STEP 3. CATEGORIZE SPACES

- Create a table of all rooms and spaces in the project and identify the following for each:
 - Ventilation CV range
 - Net occupiable space, as defined in ASHRAE Standard 62-2010, Table A.4, in room floor area (using CEN Standard EN52)
 - Occupancy category, as listed in ASHRAE Standard 62-2010, Table 6.1 or CEN Standard EN52, Table 6.2
 - Demand category, usually outdoor air supply in two categories, low building, or not low building (see CEN Standard EN52, Annex C5)
 - Demand occupancy use (see Table 6.2, Occupancy)

STEP 4. IDENTIFY APPROPRIATE PREREQUISITE REQUIREMENTS

- Follow the table back for mechanical ventilation or natural ventilation, depending on the ventilation strategy used in each space.
- For mixed-mode systems, projects must comply with mechanical ventilation requirements and the mechanical system is active, and natural ventilation requirements when the mechanical ventilation system is inactive.

Mechanically Ventilated Spaces (and Mixed-Mode Spaces When A Mechanical Ventilation Is Active)

STEP 1. DETERMINE PRELIMINARY HVAC SYSTEM CONFIGURATION

- Identify the following basic mechanical system features, which will affect the calculation of outdoor air required:
 - Single-zone, 100% outdoor air, or multiple-zone systems
 - Underfloor, overhead, or side air distribution and location of return grilles
 - Supply air temperature cooling only or heating and cooling
 - Variable air volume (VAV) or constant volume (CV) supply

STEP 2. CALCULATE REQUIRED OUTDOOR AIRFLOW UNDER OPTION 1

- Complete the ventilation rate procedure in ASHRAE Standard 62-2010, Section 6.2, to determine the minimum amount of outdoor air that must be supplied by each ventilation system.
- Complete a separate ventilation rate procedure calculation for each ventilation system.
- Account for all occupied spaces in the calculation. Perform ventilation rate procedure calculations for worst-case conditions, which typically occur in the heating mode when supply airflow is lowest or supply air temperature is highest. From Table 6.2 of the standard, select the zone air distribution effectiveness (E2) value that corresponds to the air distribution configuration of the worst-case conditions. E2 is typically less than 10 when the system is in heating mode. If E2 is greater than 10, see EA Prerequisite Minimum Energy Performance, Further Explanation, Common Issues with Energy Modeling, Ventilation (Zone air distribution effectiveness).
- As applicable, evaluate and document assumptions for all variables required for the ventilation rate procedure calculation. These variables include the percentage of total design airflow rate at condition analyzed (CA), the primary air fraction of supply air at condition analyzed (CA), the system ventilation efficiency (SE), and the fraction of local recirculated air that is representative of system return air (R).
- In special conditions that apply to systems designed to respond to varying operating conditions, such as with demand-controlled ventilation, see Further Explanation, Considerations for Variable Operating Conditions.

- Ensure that the appropriate method is selected for each system in the project. The ventilation rate procedure calculation differs for single-zone, 100% outdoor air, and multiple-zone systems. Suggested methods are as follows:
 - For single-zone systems or 100% outdoor air systems, use the calculator provided by USGBC or a user-generated spreadsheet. The GHGCalc spreadsheet is not applicable to these systems and should not be used to perform the ventilation calculations.

STEP-BY-STEP GUIDANCE +

- For multiple-zone systems, use the GHGCalc spreadsheet. This includes VAV and CV systems in which each or more air handlers supply a mixture of outdoor air and recirculated air to one or more ventilation zone (see Further Explanation, Calculations for Multiple-Zone Systems).
- Energy modeling software may also be used to perform ventilation rate procedure calculations for all three system types. Output outputs from the program are acceptable, provided they include sufficient information about the values used for all variables in the calculation.
- If the local code is more stringent than ASHRAE 62-2010, see Further Explanation, Local Equivalent to ASHRAE 62-2010.

ALTERNATIVE STEP 2. CALCULATE REQUIRED OUTDOOR AIRFLOW UNDER OPTION 2

- Follow the calculation outlined in CEN Standard EN12051-2007, Annex A, to determine the minimum amount of outdoor air that must be supplied by each ventilation system.

STEP 3. REVISE DESIGN TO MEET OUTDOOR AIR REQUIREMENTS, IF NECESSARY

- If the ventilation calculations in Step 2 indicate that the preliminary design does not provide enough outdoor air to meet the outdoor reference standard, revise the design and recalculate the minimum amount of outdoor air to confirm compliance.
- For single-zone and 100% outdoor air systems, increase the amount of outdoor air supplied by the system. For multiple-zone systems, increase supply airflow to the critical zone or increase the amount of outdoor air supplied by the system.

- In the final calculations, ensure that the net occupiable space, design occupancy number of air handlers, and outdoor air volume are consistent with the project's mechanical conditions and documentation provided for other LEED credits. Create a summary table that lists the required outdoor air intake flow and design outdoor air intake flow for each ventilation system.

STEP 4. MEET MINIMUM REQUIREMENTS

Option 1. ASHRAE Standard 62-2010

- Confirm compliance with Sections 4 through 7.
- Indicate whether the project is in a nonattainment area for fine particulate matter (PM2.5), and if so, confirm that filters with minimum efficiency reporting values (MERV) of 11 or higher have been or will be installed.
- Indicate whether the project is in an area where ozone exceeds the most recent three-year average, annual fourth-highest daily maximum eight-hour average ozone concentration of 0.127 ppm, and if so, confirm that the project has or will have an ozone abatement device for ozone.
- If using a local code instead of ASHRAE 62-2010, see Further Explanation, Local Equivalent to ASHRAE 62-2010.

Option 2. CEN Standards EN 15251-2007 and EN 15779-2007

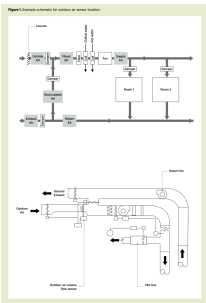
- Confirm compliance with the requirements in CEN Standard EN15779-2007 excluding Section 3.3 Thermal environment, 3.6 Acoustic environment, A.5b, and A.7.

STEP 5. IMPLEMENT AIRFLOW MONITORING

- Incorporate airflow monitoring equipment into the HVAC system design. The technique for monitoring outdoor air depends on the HVAC system. For VAV systems—for example, a 100% outdoor air energy recovery unit with demand-controlled ventilation, or any system that provides a variable amount of supply or outdoor air—a direct outdoor airflow measurement device must measure the intake flow rate (Figure 15).

- Indirect measurements, such as temperature or current transducers, cannot directly measure the airflow rate and thus are not allowed for VAV systems.
- If a 100% outdoor air system provides ventilation air to the return of downstream terminal devices (e.g., fan coil units, heat pumps), the measurement device needs to measure the outdoor airflow rate at the 100% outdoor air unit only, not at each terminal device. The ventilation rate procedure must still be calculated for each terminal device.
- For device requirements, see the specific language in the prerequisite requirements.

STEP-BY-STEP GUIDANCE +



STEP-BY-STEP GUIDANCE +

For standard exhaust systems, following ensures that the correct amount of outdoor air is being supplied to the building.

- Once the system has been balanced, a current measurement on the supply fan's airflow unit's pressure transducer or sensor monitoring device must be retained.
- If the system is a variable volume system, the measurement device needs to be retained at the VAV's outdoor air setpointing unit at each testing event. The retention and location must still be retained for the life of the system.

For all systems, when equipment is placed showing the accuracy of the monitoring devices, copies of control sequences and diagrams, and test and balance reports for the space airflow responses for each ventilation system.

Naturally Ventilated Spaces (and Mixed-Mode Systems When Mechanical Ventilation is Inactivated)

STEP 1. CONFIRM NATURAL VENTILATION EFFECTIVENESS

Use Outdoor Indication of Building Services Equipment (OIBSE) Applications Manual AMO, Natural Ventilation in Non-Domestic Buildings, Figure 2.8 (flow chart), to confirm that natural ventilation is appropriate. Retain a copy of the flow chart path for the project.

STEP 2. IDENTIFY CEILING HEIGHTS AND NATURAL VENTILATION OPENINGS

Collect the following information for each naturally ventilated space and add to the table of rooms and spaces:

- Minimum ceiling height in this space.
- Location of natural ventilation openings (on one side, two opposite sides, or two adjacent sides).
- Size of the natural ventilation openings (operable area).

STEP 3. PERFORM NATURAL VENTILATION PROCEDURE

Use the natural ventilation procedure in ASHRAE 62.1-2010, Section 6.4, to determine the size of openings required in each space and the maximum distance from the openings that can be considered naturally ventilated.

- Compare the calculation results with the design and review, if necessary, to ensure that all spaces meet the requirements of the standard.
- If the project includes an engineered natural ventilation system approved by the authority having jurisdiction, the requirements of Section 6.4 do not apply (see Further Explanation, Authority Having Jurisdiction Exceptions) .
- Confirm compliance with the exhaust ventilation requirements of ASHRAE Standard 62.1-2010, Section 6.5.

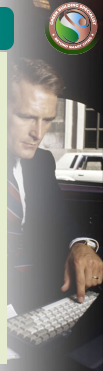
STEP 4. CONFIRM MECHANICAL SYSTEM EXCEPTION OR COMPLIANCE

If the project qualifies for an exception to the mechanical ventilation requirement in ASHRAE 62.1-2010, Section 6.4, prepare an exasperatory variance.

If the project does not qualify for exception, follow the step-by-step instructions for mechanical ventilation systems to demonstrate compliance with ASHRAE 62.1-2010 when mechanical ventilation is active (see Further Explanation, Natural Ventilation Exceptions) .

STEP 5. IMPLEMENT MONITORING SYSTEM

Incorporate airflow monitoring equipment into the natural ventilation system design through one of the following three monitoring strategies:



STEP-BY-STEP GUIDANCE +

Direct exhaust airflow measurement device

- Incorporate exhaust airflow monitoring equipment that has an accuracy of +/-10% of the design minimum exhaust airflow rate.
- Naturally ventilated systems induce passive air movement from openings to the point of exhaust, requiring that airflow measurement devices be placed at the exhaust location.
- Configure the exhaust airflow monitoring equipment to generate an alarm when airflow values vary by 15% or more from the exhaust airflow setpoint.
- Retain equipment cutsheets for the monitors, plans indicating sensor locations, and copies of control sequences and diagrams.

Alarmed openings for naturally ventilated spaces

- Identify all windows, louvers, and trickle vents used for natural ventilation.
- Each opening counted as a natural ventilation intake for this prerequisite must have an alarm under this strategy. For example, an office with two windows intended to provide natural ventilation must have alarms installed on both windows. However, if only one window is counted as a natural ventilation intake, only one window is required to have an alarm.

Carbon dioxide (CO₂) monitors

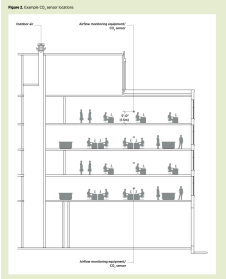
- Install a CO₂ sensor in each thermal zone.
- CO₂ sensors must be located in the breathing zone, as defined in the prerequisite requirements (Figure 2). CO₂ sensors installed in return air ducts cannot be used to meet the requirements.
- Determine CO₂ concentration setpoint(s) using the methods in ASHRAE 62.1-2010, Appendix C. See *ASHRAE 62.1-2010 User's Manual, Appendix A*, for calculations and examples. Configure the CO₂ monitoring system to generate an audible or visual alarm to the system operator if the differential CO₂ concentration exceeds the setpoint by more than 10%.





STEP-BY-STEP GUIDANCE +

Figure 2. Example CO₂ sensor location







REQUIREMENTS

Sources

HVAC Background Noise
Achieve a maximum background noise level of 40 dBA from heating, ventilating, and air-conditioning (HVAC) systems in classrooms and other core learning spaces. Follow the recommended methodologies and level practices for mechanical system noise control in ASHRAE Standard 62.2-2010, Part 1, Acoustical Performance Criteria, Design Requirements and Guidelines for Schools or a local equivalent for projects outside the U.S.

Exterior Noise
For high-noise sites (peak-hour L_{eq} above 60 dBA during school hours), implement acoustic treatment and other measures to minimize noise intrusion from exterior spaces and control sound transmission between classrooms and other core learning spaces. Projects at least one-half mile (800 meters) from any significant noise source (e.g., aircraft overflights, highways, trains, industry) are exempt.

Reverberation Time

Design each of the classrooms and other core learning spaces to meet one of the following:

- The total surface area of acoustic wall panels, ceiling finishes, and other sound absorbent finishes equals or exceeds the total ceiling area of the room (excluding lights, diffusers, and grilles). Materials must have an NRC of 0.70 or higher to be included in the calculation.
- The calculated or measured reverberation times comply with ASHRAE Standard 62.2-2010, Part 1.
- For spaces > 20,000 cubic feet (568 cubic meters), the calculated or measured reverberation times comply with Table 1.

Type of room	Mid-frequency Reverberation time (s)
Large lecture room (more than 50 people)	≤ 1.0
Library	≤ 0.6
Assembly hall, multi-purpose hall	0.8 - 1.2
Indoor sports hall, swimming pool	1.0-2.0
Gymnasium/activity studio	≤ 1.5
Dance studio	≤ 1.2

*For details of the above reverberation time requirements, please refer to Building Bulletin 93 – Acoustic Design of Schools. Performance Standards published by the UK's Department for Education in February 2015.

Note: For reverberation time > 0.60 s (0.60 s is the mid-frequency reverberation time), the value is the arithmetic average of the reverberation times in 500Hz, 1 kHz, and 2kHz octave bands, or the arithmetic average of the reverberation times in the one-third octave bands from 400 Hz to 2.5 kHz.



CONNECTION TO ONGOING PERFORMANCE

LEED O+M EQ prerequisite Indoor Environmental Quality Performance: Strategies to minimize HVAC background noise, exterior noise and reverberation time for newly constructed schools can help contribute to better indoor environmental quality and overall occupant satisfaction during operations phase.



REQUIRED DOCUMENTATION

New Construction, Core and Shell, Schools, Retail, Data Centers, Warehouses and Distribution Centers, Hospitality				
Documentation	Option 1	Option 2	Naturally ventilated	Mixed Mode
Confirmation that project meets minimum requirements of ASHRAE 62.1-2010, Sections 4-7, or CEN Standard 13779-2007	X	X		X
Confirmation that project has MERV 11 or higher filters (if project is in re-entrainment area for PM2.5)	X	X		X
Ventilation rate procedure or CEN calculations and documentation of assumptions for calculation variables	X	X		X
Confirmation that project meets minimum requirements of ASHRAE Standard 62.1-2010, Section 7, and exhaust ventilation requirements of Section 6.5			X	X
Documentation of CIBSE flow diagram process for project			X	X
Natural ventilation procedure calculations and ventilation opening information			X	X
Any natural ventilation exception from mechanical ventilation system (ASHRAE 62.1-2010, Section 6.4)			X	X
Any exception from authority having jurisdiction			X	X
Controls drawing showing monitoring devices (outdoor airflow measuring device, current transducer, airflow switch, or similar monitor, automatic indication devices, CO ₂ sensor)	X	X	X	X



REQUIRED DOCUMENTATION

Healthcare			
Documentation	Mechanically ventilated	Naturally ventilated	Mixed mode
Confirmation that project meets minimum requirements of ASHRAE Standard 170-2008, Sections 6-8	X		X
If applicable, air balance summary table to demonstrate that the minimum OA changes, min total air changes, and space pressurization relationships provided are consistent with the FGI or ASHRAE Standard 170	X		X
If applicable, ventilation rate procedure calculations and documentation of assumptions for calculation variables	X		X
Documentation of CIBSE flow diagram process for project		X	X
Natural ventilation procedure calculations and ventilation opening information		X	X
Any natural ventilation exception from mechanical ventilation system (ASHRAE 62.1-2010, Section 6.4)		X	X
Any exception from authority having jurisdiction		X	X
Controls drawing showing monitoring devices (outdoor airflow measuring device, current transducer, airflow switch, or similar monitor, automatic indication device, CO ₂ sensor)	X	X	X

REFERENCED STANDARDS

ASHRAE 62.1-2010: ashrae.org

ASHRAE Standard 170-2008: ashrae.org

2010 FGI Guidelines for Design and Construction of Health Care Facilities: fgiguidelines.org CEN Standard EN 15251-2007: cen.eu

CEN Standard EN 13779-2007: cen.eu

CIBSE Applications Manual AM10, March 2009: cibse.org

TERMS AND DEFINITIONS

Occupable space is an enclosed space intended for human activities, excluding those spaces that are intended primarily for other purposes, such as storage rooms and equipment rooms, and that are occupied only occasionally and for short periods of time (ASHRAE 62.1-2010).

Occupied space is an enclosed space intended for human activities, excluding those spaces that are intended primarily for other purposes, such as storage rooms and equipment rooms, and that are only occupied occasionally and for short periods of time. Occupied spaces are further classified as regularly occupied or nonregularly occupied based on the duration of the occupancy, individual or multi-occupant based on the quantity of occupants, and densely or non-densely occupied spaces based on the concentration of occupants in the space.

Unoccupied space is an area designed for equipment, machinery, or storage rather than for human activities. An equipment area is considered unoccupied only if retrieval of equipment is occasional.