Increased ventilation

EQ1.3 | Possible point

Glossary

Intent

To provide additional outdoor air ventilation to improve indoor air quality (IAQ) for improved occupant comfort, well-being and productivity.

To provide additional outdoor air ventilation to improve indoor air quality (IAQ) for improved occupant comfort, well-being and productivity.

Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, well-being and productivity.

To provide additional outdoor air ventilation to improve indoor air quality for occupants' comfort, well-being and productivity.

Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, well-being and productivity.

Prevent indoor air quality problems resulting from the construction/renovation process in order to help sustain the comfort and well-being of construction workers and building occupants.

Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, well-being and productivity.

Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, well-being and productivity.

Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, well-being and productivity.

Provide for the effective delivery and mixing of fresh air to support the safety, comfort and well-being of building occupants.

Provide for the effective delivery and mixing of fresh air to support the health, safety, and comfort of building occupants.

To provide additional outdoor air ventilation to improve indoor air quality (IAQ) and promote occupant comfort, well-being and productivity.

Requirements

Case 1. Mechanically vented spaces

Case 2. Naturally vented spaces

Determine whether natural ventilation is an effective strategy for the project by following the flow diagram process in Figure 2.8 of the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual 10: 2005, Natural Ventilation in Non-domestic Buildings.

AND

Option 1. CIBSE or non-U.S. equivalent

Show that the natural ventilation systems design meets the recommendations set forth in the CIBSE manuals appropriate to the project space.

Path 1

Use CIBSE Applications Manual 10: 2005, Natural Ventilation in Non-domestic Buildings. Projects outside the U.S. may use a local equivalent.

Path 2

Use CIBSE AM 13:2000, Mixed Mode Ventilation. Projects outside the U.S. may use a local equivalent.

OR

Option 2. Airflow Model

Use a macroscopic, multizone, analytic model to predict that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE Standard 62.1-2007 section 6 (with errata but without addenda), at least 90% of occupied spaces. Projects outside the U.S. may use Annex B of Comité Européen de Normalisation (CEN) Standard EN 15251: 2007, or a local equivalent to section 6 of ASHRAE Standard 62.1-2007 to define the minimum ventilation rates.

Case 1. Mechanically vented spaces

Option 1. ASHRAE standard 62.1-2007 or non-U.S. equivalent

Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2007 (with errata but without addenda[1]) as determined by IEQ Prerequisite 1: Minimum Indoor Air Quality Performance. Projects outside the U.S. may use a local equivalent to ASHRAE Standard 62.1-2007, if the same is used for IEQ Prerequisite 1: Minimum Indoor Air Quality Performance.

OR

Option 2. CEN Standard EN 15251: 2007

Projects outside the U.S. may earn this credit by increasing breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by Annex B of Comité Européen de Normalisation (CEN) Standard EN 15251: 2007, Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics, as determined by IEQ Prerequisite 1: Minimum Indoor Air Quality Performance,

Case 2. Naturally vented spaces

Determine whether natural ventilation is an effective strategy for the project by following the flow diagram process in Figure 2.8 of the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual 10: 2005, Natural Ventilation in Non-domestic Buildings.

AND

Option 1. CIBSE or non-U.S. equivalent

Show that the natural ventilation systems design meets the recommendations set forth in the CIBSE manuals appropriate to the project space.

Path 1

Use CIBSE Applications Manual 10: 2005, Natural Ventilation in Non-domestic Buildings. Projects outside the U.S. may use a local equivalent.

Path 2

Use CIBSE AM 13:2000, Mixed Mode Ventilation. Projects outside the U.S. may use a local equivalent.

OR

Option 2. Airflow Model

Use a macroscopic, multizone, analytic model to predict that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE Standard 62.1-2007 section 6 (with errata but without addenda), at least 90% of occupied spaces. Projects outside the U.S. may use Annex B of Comité Européen de Normalisation (CEN) Standard EN 15251: 2007, or a local equivalent to section 6 of ASHRAE Standard 62.1-2007 to define the minimum ventilation rates.

For mechanically ventilated spaces

- Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2004 as determined by EQ Prerequisite 1.

For naturally ventilated spaces

Design natural ventilation systems for occupied spaces to meet the recommendations set forth in the Carbon Trust “Good Practice Guide 237” [1998]. Determine that natural ventilation is an effective strategy for the project by following the flow diagram process shown in Figure 1.18 of the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual 10: 2005, Natural ventilation in non-domestic buildings.

AND

- Use diagrams and calculations to show that the design of the natural ventilation systems meets the recommendations set forth in the CIBSE Applications Manual 10: 2005, Natural ventilation in non-domestic buildings.
  OR
- Use a macroscopic, multi-zone, analytic model to predict that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE 62.1-2004 Chapter 6, for at least 90% of occupied spaces.

For mechanically ventilated spaces:

Increase outdoor air ventilation rates for all air-handling units serving occupied spaces by at least 30% above the minimum required by ASHRAE 62.1–2007.

For naturally ventilated spaces:

Design natural ventilation systems for occupied spaces to meet the recommendations set forth in “Good Practice Guide 237: Natural Ventilation in Non-domestic Buildings” (1998). Determine whether natural ventilation is an effective strategy for the project by following the flow diagram process in Figure 2.8 of CIBSE Applications Manual 10: 2005, “Natural Ventilation in Non-domestic Buildings.”

In addition, either 1) use diagrams and calculations to show that the design of the natural ventilation systems meets the recommendations set forth in CIBSE Applications Manual 10: 2005, “Natural Ventilation in Non-domestic Buildings,” or 2) use a macroscopic, multizone, analytic model to predict that room-by-room airflows will effectively naturally ventilate at least 90% of occupied spaces.

For mechanically ventilated spaces:

Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE 62.1-2004 as determined by EQ Prerequisite 1.

For naturally ventilated spaces:

Design natural ventilation systems for occupied spaces to meet the recommendations set forth in the Carbon Trust “Good Practice Guide 237” [1998]. Determine that natural ventilation is an effective strategy for the project by following the flow diagram process shown in Figure 1.18 of the CIBSE (The Chartered Institution of Building Services Engineers) “Applications Manual 10: 2005, Natural ventilation in non-domestic buildings.”

And either of the following;

- Use diagrams and calculations to show that the design of the natural ventilation systems meets the recommendations set forth in the CIBSE “Applications Manual 10: 2005, Natural ventilation in non-

domestic buildings."

OR

- Use a macroscopic, multi-zone, analytic model to predict that room-by-room airflows will effectively naturally ventilate at least 90% of occupied spaces.

Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the tenant space as follows:

During construction meet or exceed the recommended Design Approaches of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings Under Construction, Second Edition - November, 2007, Chapter 3.

Protect stored on-site and installed absorptive materials from moisture damage.

If air handlers must be used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grill, as determined by ASHRAE 52.2-1999.

Replace all filtration media immediately prior to occupancy. Coordinate with EQ Credits 3.2 and 5, installing only a single set of final filtration media.

Option A

For Mechanically Ventilated Spaces:

- Increase outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum required by ASHRAE 62.1-2004.

Option B

For Naturally Ventilated Spaces:

- Design natural ventilation systems for occupied spaces to meet the recommendations set forth in the "Good Practice Guide 237: Natural ventilation in non-domestic buildings" (1998). Determine that natural ventilation is an effective strategy for the project by following the flow diagram process shown in Figure 2.8 of the CIBSE Applications Manual 10: 2005, "Natural ventilation in non-domestic buildings."

AND EITHER

- Use diagrams and calculations to show that the design of the natural ventilation systems meets the recommendations set forth in the CIBSE Applications Manual 10: 2005, "Natural ventilation in nondomestic buildings."

OR

- Use a macroscopic, multi-zone, analytic model to predict that room-by-room airflows will effectively naturally ventilate at least 90% of occupied spaces.

For mechanically ventilated spaces

- Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2004 as determined by EQ Prerequisite 1.

For naturally ventilated spaces

Design natural ventilation systems for occupied spaces to meet the recommendations set forth in the Carbon Trust "Good Practice Guide 237" [1998]. Determine that natural ventilation is an effective strategy for the project by following the flow diagram process shown in Figure 1.18 of the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual 10: 2005, Natural ventilation in non-domestic buildings.

AND

- Use diagrams and calculations to show that the design of the natural ventilation systems meets the recommendations set forth in the CIBSE Applications Manual 10: 2005, Natural ventilation in non-domestic buildings.

OR

- Use a macroscopic, multi-zone, analytic model to predict that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE 62.1-2004 Chapter 6, for at least 90% of occupied spaces.

For mechanically ventilated spaces

- Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2004 as determined by EQ Prerequisite 1.

For naturally ventilated spaces

Design natural ventilation systems for occupied spaces to meet the recommendations set forth in the Carbon Trust "Good Practice Guide 237" [1998]. Determine that natural ventilation is an effective strategy for the project by following the flow diagram process shown in Figure 1.18 of the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual 10: 2005, Natural ventilation in non-domestic buildings.

AND

- Use diagrams and calculations to show that the design of the natural ventilation systems meets the recommendations set forth in the CIBSE Applications Manual 10: 2005, Natural ventilation in non-domestic buildings.

OR

- Use a macroscopic, multi-zone, analytic model to predict that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE 62.1-2004 Chapter 6, for at least 90% of occupied spaces.
- The core and shell buildings that are designed to be naturally ventilated must provide the capability for the tenant build-out to meet the requirements of this credit.

For mechanically ventilated buildings, design ventilation systems that result in an air change effectiveness (ε_{ac}) greater than or equal to 0.9 as determined by ASHRAE 129-1997. For naturally ventilated spaces demonstrate a distribution and laminar flow pattern that involves not less than 90% of the room or zone area in the direction of air flow for at least 95% of hours of occupancy.

For mechanically ventilated buildings, design ventilation systems that result in an air

change effectiveness (ε_{ac}) greater than or equal to 0.9 as determined by ASHRAE 129-1997. For naturally ventilated spaces demonstrate a distribution and laminar flow pattern that involves not less than 90% of the room or zone area in the direction of air flow for at least 95% of hours of occupancy.

CASE 1. Mechanically Ventilated Spaces

Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2007 (with errata but without addenda[27]) (OR) an equivalent Local standard, as determined by IEQ Prerequisite 1: Minimum Indoor Air Quality Performance.

If using a local standard for establishing a baseline and measuring performance relative to that baseline, the following general topics must be addressed for equivalency with ASHRAE Standard 62.1–2007 (with errata but without addenda):

- Outdoor air quality
- Systems and equipment
- Ventilation rate procedure and indoor air quality IAQ (indoor air quality) procedure
- Construction and system start-up

For more details, see the ASHRAE Reference Guide or relevant sections of the equivalent Local standard.

CASE 2. Naturally Ventilated Spaces

Determine that natural ventilation is an effective strategy for the project by following the requirements of the flow diagram process shown in the CIBSE Applications Manual 10: 2005, Figure 2.8.

OR

Use a Local standard to demonstrate performance that is equivalent to CIBSE by establishing a baseline, and measure performance relative to that baseline. The following guidelines outline the methodology for establishing acceptable benchmarks and metrics to demonstrate equivalency of the Local standard with Figure 2.8 of CIBSE AM 10:2005:

- Heat gain
- Transient occupancy
- Seasonal mixed-mode ventilation
- Floor plan
- Courtyard or atrium layout
- Zonal mixed-mode ventilation
- Perimeter zone conditions, including noise and pollution levels
- Control of ventilation by occupants
- Temperature and relative humidity control
- Humidification

AND

OPTION 1

Show that the natural ventilation systems design meets the recommendations set forth in the CIBSE manuals appropriate to the project space. (OR) Use a local standard to demonstrate performance that is equivalent to the requirements of CIBSE Applications Manual 10: 2005 or CIBSE AM 13: 2000, Mixed Mode Ventilation, by substituting appropriate benchmarks and metrics for establishing a baseline, and measure performance relative to that baseline.

PATH 1:

Use CIBSE Applications Manual 10: 2005, Natural Ventilation in Non-domestic Buildings (OR) use a local standard to address the following general topics and demonstrate equivalency with CIBSE AM 10: 2005:

Design Strategy

- Design
- Selection process for natural ventilation
- Wind and stack effects
- Natural ventilation strategies (e.g., chimney ventilation, stack ventilation)

Ventilation Components and System Integration

- Principles, products and processes for ventilation and control
- Ventilation opening types
- Internal obstructions
- Background leakage
- Window stays and automatic actuators
- Control system
- Installation and commissioning

Design Calculations

- Required flow rates
- Ventilation design tool selection
- Design procedures using envelope flow models
- Input data requirements and selection
- Reservoir effect

PATH 2.

Use CIBSE AM 13:2000, Mixed Mode Ventilation (OR) use a local standard to address the following general topics and demonstrate equivalency with CIBSE AM 13: 2000:

- Mixed mode ventilation types
- Design principles for mixed mode buildings and systems
- Building fabric properties
- Contingency mixed mode
- Complementary mixed mode
- Zoned mixed-mode systems
- Control of mixed-mode systems
- Commissioning considerations for the designer
- Handover, management and operation considerations for the designer
- Modeling and modeling techniques
- Energy and environmental benefits
- Window design
- Thermal comfort
- Commissioning activities
- Handover, management, operation and maintenance considerations

OR

OPTION 2

Use a macroscopic, multizone, analytic model to predict that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE 62.1-2007 Chapter 6 (with errata but without addenda[27]), for at least 90% of occupied spaces. (OR) Use a Local standard to demonstrate minimum ventilation rate performance equivalent to the requirements of ASHRAE 62.1–2007, Chapter 6 (with errata but without addenda[27]), for at least 90% of occupied spaces, by substituting appropriate benchmarks and metrics for establishing a baseline, and measure performance relative to that baseline. The following general topics must be addressed to demonstrate equivalency with ASHRAE:

- Ventilation rate procedure
- Indoor air quality (IAQ) procedure
- Design documentation procedures

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[27] Project teams wishing to use ASHRAE approved addenda for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.