

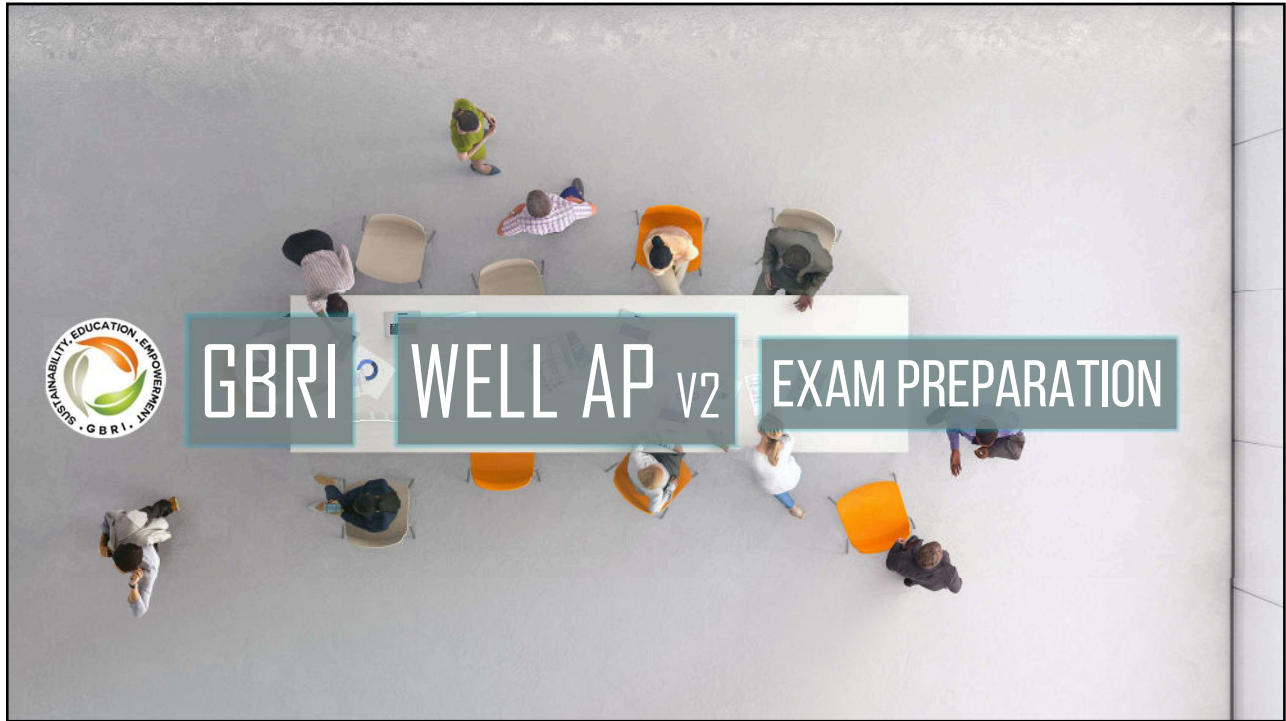
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Learning Hub @ GBRI

Presents

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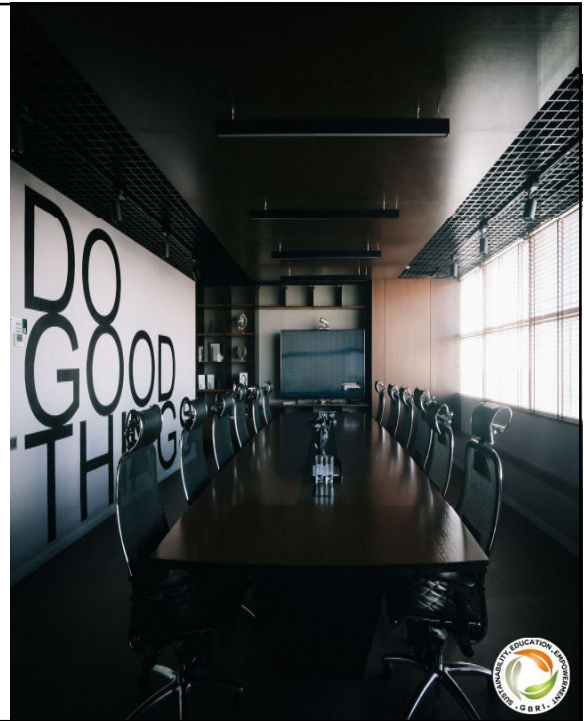


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AGENDA

- 01 WELL Certification
- 02 WELL Portfolio
- 03 Air & Water Concept
- 04 Case Study
- 05 Homework & What's Next



5

03.

Air & Water Concepts

6

Knowledge Domains & Questions

 Air 11
 Water 9
 Nourishment 10
 Light 9
 Movement 7

7	Thermal Comfort	
8	Sound	
9	Materials	
9	Mind	
9	Community	
12	WELL Certification	

7

Knowledge Domain 1: Air

Knowledge of:

1. Types, sources and acceptable thresholds of indoor air contaminants.
2. Short- and long-term effects of indoor air quality on human health, well-being and productivity.
3. Design, construction and operational processes that affect air quality throughout the lifecycle of buildings.
4. Strategies for addressing and monitoring indoor air quality.

Skills In:

1. Analyzing the air quality results from on-site monitoring and laboratory-based tests to inform decision-making.
2. Recommending strategies to prohibit smoking, minimizing occupant exposure to secondhand smoke and reducing smoke pollution.
3. Recommending strategies for mechanical and natural ventilation to dilute human- and product-generated air pollutants.
4. Recommending strategies to mitigate the introduction of construction related pollutants into indoor air and remediating construction-related indoor air contamination.
5. Recommending strategies that limit sources of air pollution such as combustion, and isolating key sources of odors, germs, pollution or humidity.
6. Recommending strategies to mitigate risks from indoor contamination and pollution sources.



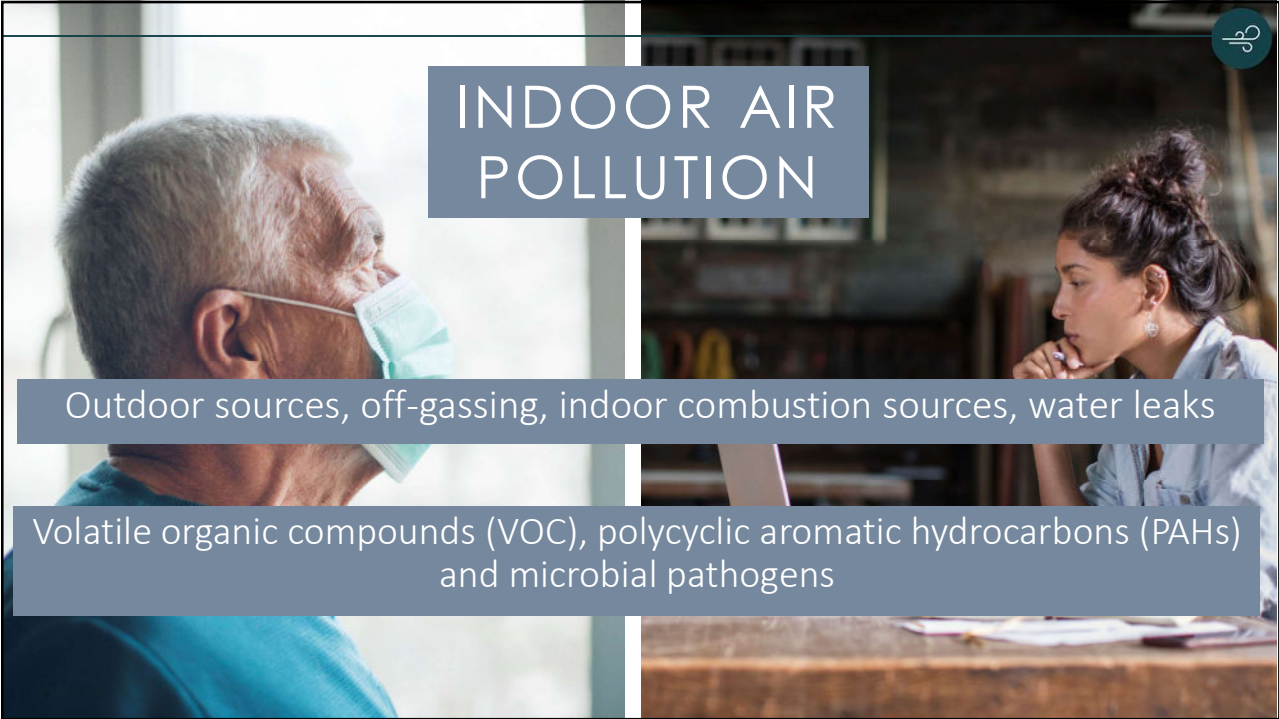
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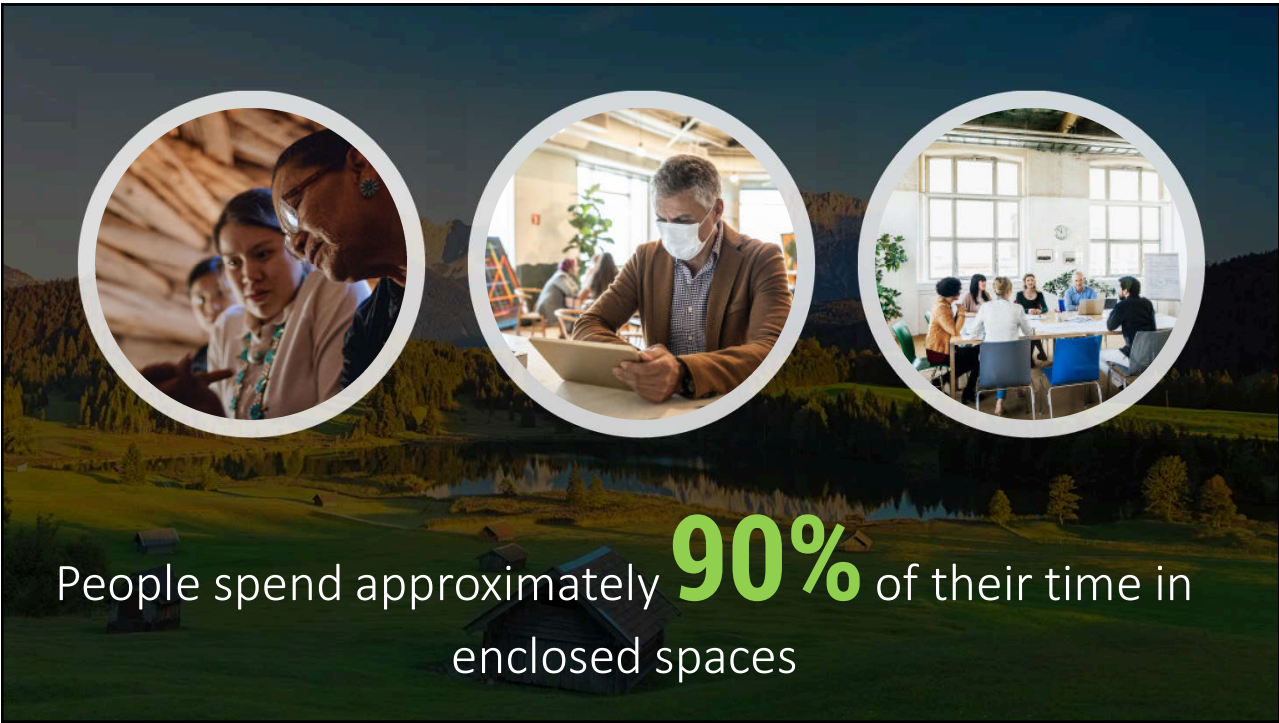
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Negative short and long-term health and well-being outcomes

Less Severe

- Headache
- Dry throat
- Eye irritation
- Runny nose

More Severe

- Asthma attacks
- Legionella bacteria
- Carbon monoxide poisoning

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Particulate Matter

Particulate matter comes in different sizes (coarse and fine) from a number of sources including:

- Small particles: Dust, etc. from construction, mining and agriculture; Pollen
- Fine particles (**PM 2.5**): Burning fossil fuels in factories, power plants, and diesel- and gasoline-powered motor vehicles; fires

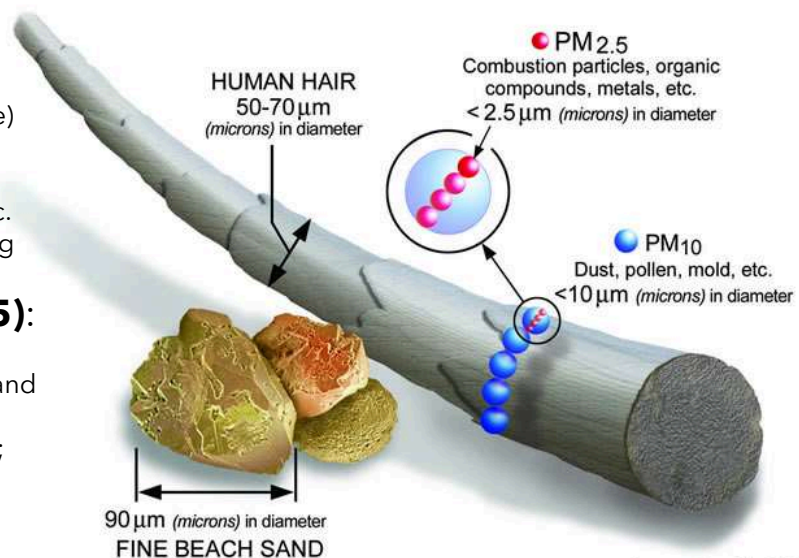


Image courtesy of the U.S. EPA

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Particulate Matter – Serious Health Impacts

Impaired respiratory function

Chronic cough

Bronchitis

Chest illness

Chronic obstructive pulmonary disease (COPD)

Pneumonia

Cardiovascular diseases

Allergic disease and asthma

Cardiopulmonary diseases

Cancer



Source: Climate Change and Health - Dr. Joan Schiller

15

90%

Time, we spend indoors

2 to 5 times

Concentrations of some pollutants than outdoors



16



17



Cooking

represents one of the single largest contributors, generating particulate matter (PM2.5) at concentrations **four** times greater than major haze events in Beijing.

Source: The Kitchen as a pollution hazard, NY Times

18

VOCs levels or concentrations

1000

times higher indoors



19

BRI

Building Related Illness



SBS

Sick Building Syndrome

20

Symptoms of BRI can be directly attributed to **airborne** building contaminants



21

Although the symptoms of SBS can be linked to time spent in a building, no specific illness **or cause** can be identified



22



is recognized as an important factor influencing the transmission of airborne diseases

23



GBRI Community Center

Location: New York City

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AIR : 14 Features

4 Preconditions

10 Optimizations

A01	Air Quality
A02	Smoke-Free Environment
A03	Ventilation Design
A04	Construction Pollution Management
A05	Enhanced Air Quality
A06	Enhanced Ventilation Design
A07	Operable Windows
A08	Air Quality Monitoring and Awareness
A09	Pollution Infiltration Management
A10	Combustion Minimization
A11	Source Separation
A12	Air Filtration
A13	Enhanced Supply Air
A14	Microbe and Mold Control

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A01 AIR QUALITY P



Issue

Exposure to air pollutants, such as Volatile Organic Compounds (VOCs), ozone, particulate matter.....

Intent

Smoking and the use of e-cigarettes is prohibited in interior spaces within the project boundary

Summary

This WELL feature requires projects to provide acceptable air quality levels, as determined by public health authorities.

Solutions

Source control strategies.

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A01 AIR QUALITY **P**

Issue

Exposure to air pollutants, such as Volatile Organic Compounds (VOCs), ozone, particulate matter, carbon monoxide and others has been shown to increase the risk of respiratory and cardiovascular diseases, in addition to causing thousands of cancer deaths annually.

Intent

Provide a basic level of indoor air quality that contributes to the health and well-being of building users

Summary

This WELL feature requires projects to provide acceptable air quality levels, as determined by public health authorities.

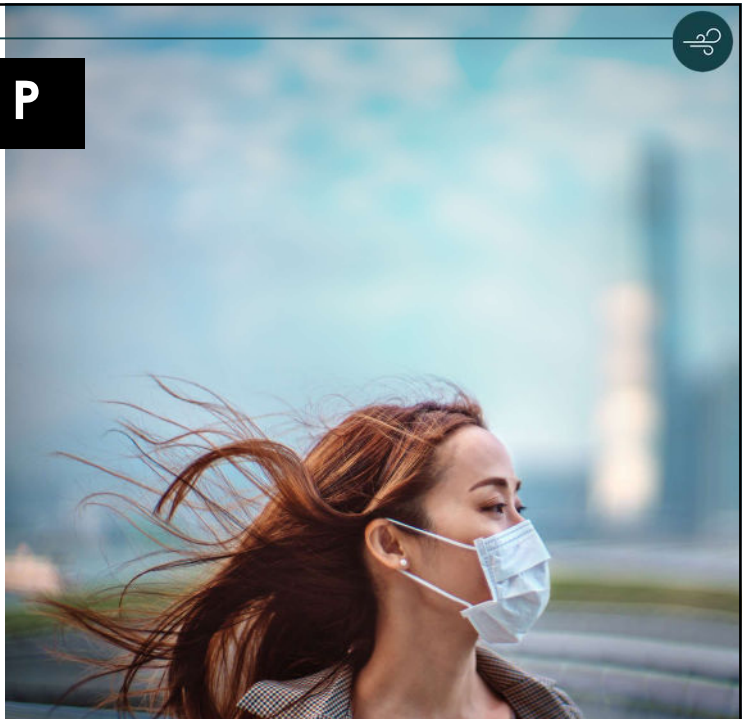


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A01 AIR QUALITY **P**

Solutions

- WHO & EPA - list of "criteria" air pollutants with established permissible levels pollutants, duration of exposure and health risks.
- Source control strategies
- Passive and active building design and operation strategies
- Human behavior interventions.
- Effective mechanical ventilation



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A01 AIR QUALITY **P**

PART 1: Meet Thresholds for Particulate Matter

- PM 2.5
- PM 10

PART 2: Meet Thresholds for Organic Gases

- Benzene
- Formaldehyde
- Toluene

PART 3: Meet Thresholds for Inorganic Gases

- Carbon monoxide
- Ozone

PART 4: Meet Thresholds for Radon

PART 5: Monitor Air Parameters



Thresholds that appear as part of A01: Parts 1 - 4	
Part 1. Meet Thresholds for Particulate Matter	
For All Spaces except Commercial Kitchen Spaces & Industrial	For Commercial Kitchen Spaces & Industrial
Option 1. The following thresholds are met in occupiable spaces: a. PM _{2.5} : 15 µg/m ³ or lower. b. PM ₁₀ : 50 µg/m ³ or lower.	Option 1. The following threshold is met: a. PM _{2.5} : 35 µg/m ³ or lower.
Option 2. For projects where the annual average outdoor PM _{2.5} level is 35 µg/m ³ or higher, the following thresholds are met: a. PM _{2.5} : 25 µg/m ³ or lower. b. PM ₁₀ : 50 µg/m ³ or lower.	Option 2. For projects where the annual average ambient PM _{2.5} level is 35 µg/m ³ or higher, the following thresholds are met: a. PM _{2.5} equal to 30% of the 24- or 48-hour average of outdoor levels on the day(s) of performance testing. b. PM ₁₀ equal to 30% of the 24- or 48-hour average of outdoor levels on the day(s) of performance testing.
Option 3. For projects where the annual average outdoor PM _{2.5} level is 35 µg/m ³ or higher, the following thresholds are met: a. PM _{2.5} less than or equal to 30% of the 24- or 48-hour average of outdoor levels on the day(s) of performance testing. b. PM ₁₀ less than or equal to 30% of the 24- or 48-hour average of outdoor levels on the day(s) of performance testing.	
Part 2. Meet Thresholds for Organic Gases	
Option 1. The following thresholds are met in occupiable spaces: a. Benzene (CAS 71-43-2): 10 µg/m ³ or lower. b. Formaldehyde (CAS 50-00-0): 50 µg/m ³ or lower. c. Toluene (CAS 108-88-3): 300 µg/m ³ or lower.	

EMBEDDED CONTENT



A01 AIR QUALITY

PART 1: Meet Thresholds for Particulate Matter

For All Spaces except Commercial Kitchen Spaces & Industrial:

Option 1: Acceptable thresholds

- PM 2.5 (15 $\mu\text{g}/\text{m}^3$ or lower)
- PM 10 (50 $\mu\text{g}/\text{m}^3$ or lower)

Option 2: Modified thresholds in polluted regions

limited in WELL Certification level to Gold

- PM 2.5 (25 $\mu\text{g}/\text{m}^3$ or lower)
- PM 10 (50 $\mu\text{g}/\text{m}^3$ or lower)

Option 3: Dynamic thresholds in polluted regions

limited in WELL Certification level to Silver

- PM 2.5 and PM 10 ($\leq 30\%$ of the 24- or 48-hour average of outdoor levels – on the day of performance testing)

http://www.who.int/phe/health_topics/outdoorair/databases/cities/en/

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A01 AIR QUALITY

PART 1: Meet Thresholds for Particulate Matter

For Commercial Kitchen Spaces & Industrial

Option 1: Acceptable thresholds

- PM 2.5 (35 $\mu\text{g}/\text{m}^3$ or lower)

Option 2: Dynamic thresholds in polluted regions

limited in WELL Certification level to Silver

- PM 2.5 and PM 10 ($\leq 30\%$ of the 24- or 48-hour average of outdoor levels – on the day of performance testing)

http://www.who.int/phe/health_topics/outdoorair/databases/cities/en/

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A01 AIR QUALITY

PART 1: Meet Thresholds for Particulate Matter

Other Spaces – Multifamily Residential Projects

- Multifamily residential projects may achieve WELL Certification at the Bronze or Silver level **without testing** in dwelling units, but cannot achieve Gold or Platinum without testing in dwelling units

Other Spaces – Core & Shell Projects

- Meet these requirements in non-leased spaces provided, this areas comprises **at least 2.5%** of the total project area. Otherwise, meet these requirements in non-leased space plus sufficient leased space to sum to **2.5% of the total project area.**

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A01 AIR QUALITY

PART 2: Meet Thresholds for Organic Gases

For All Spaces

Option 1: Laboratory-based VOC tests

- Benzene: 10 $\mu\text{g}/\text{m}^3$ or lower.
- Formaldehyde: 50 $\mu\text{g}/\text{m}^3$ or lower.
- Toluene: 300 $\mu\text{g}/\text{m}^3$ or lower

Option 2: VOC monitoring

- Sensors to measure total VOC at least **once per hour** (One per every 3,500 ft)
- **Previous One month** - VOC levels of 500 $\mu\text{g}/\text{m}^3$ or lower for at least **90%** of regularly occupied hours for all sensors

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A01 AIR QUALITY

PART 2: Meet Thresholds for Organic Gases

Other Spaces – Multifamily Residential Projects

- Multifamily residential projects may achieve WELL Certification at the Bronze or Silver level **without testing** in dwelling units, but cannot achieve Gold or Platinum without testing in dwelling units

Other Spaces – Core & Shell Projects

- Meet these requirements in non-leased spaces provided, this areas comprises **at least 2.5%** of the total project area. Otherwise, meet these requirements in non-leased space plus sufficient leased space to sum to **2.5% of the total project area.**

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A01 AIR QUALITY

PART 3: Meet Thresholds for Inorganic Gases

For All Spaces except Commercial Kitchen Spaces & Industrial:

Occupiable spaces

- Carbon monoxide: 10 mg/m³ [9 ppm] or lower.
- Ozone: 100 µg/m³ [51 ppb] or lower.

For Commercial Kitchen Spaces & Industrial

- Carbon monoxide: 34 mg/m³ [30 ppm] or lower.
- Ozone: 100 µg/m³ [51 ppb] or lower.

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A01 AIR QUALITY **PART 4: Meet Thresholds for Radon**

For All Spaces

For regularly occupied spaces at or below grade

- The radon is 0.15 Bq/L [4 pCi/L] or lower
- Test is conducted per 25,000 ft (2300 m) of regularly occupied space at or below grade.
- All regularly occupied spaces at or below grade meet Feature A03, Part 1, Option 1.

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EPA United States Environmental Protection Agency

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Radon

Which Radon Zone Do You Live In?
View EPA Map of Radon Zones and Supplemental Information

Radon is a naturally occurring radioactive gas that can cause lung cancer. You can't see or smell radon. Testing is the only way to know your level of exposure. Radon can have a big impact on your Indoor Air Quality. Which Radon Zone do you live in? Find Data and Information about Regional, State and Tribal Radon Programs.

Individuals and Families **Home Buyers and Sellers** **Builders and Contractors**

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A01 AIR QUALITY

PART 5: Monitor Air Parameters

For All Spaces except Dwelling Units

- The pollutants listed in Parts 1-3 (PM, Organic gases and Inorganic gases) of this feature are monitored in regularly occupied spaces at intervals **no longer than once per year**, and the results are **submitted annually** through the WELL digital platform.
- *The number and location of sampling points for on-going monitoring complies with Performance Verification Guidebook*

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AIR				0 POINTS	
Y	?	N	Weight	ID	Part Name
Y			Required	A01.1	Meet Thresholds for Particulate Matter
Y			Required	A01.2	Meet Thresholds for Organic Gases
Y			Required	A01.3	Meet Thresholds for Inorganic Gases
Y			Required	A01.4	Meet Thresholds for Radon
Y			Required	A01.5	Monitor Air Parameters
Y			Required	A02.1	Prohibit Indoor Smoking
Y			Required	A02.2	Prohibit Outdoor Smoking
Y			Required	A03.1	Ensure Adequate Ventilation
Y			Required	A04.1	Mitigate Construction Pollution
			2 points	A05.1	Meet Enhanced Thresholds for Particulate Matter
			1 point	A05.2	Meet Enhanced Thresholds for Organic Gases
			1 point	A05.3	Meet Enhanced Thresholds for Inorganic Gases
			2 points	A06.1	Increase Outdoor Air Supply (30% 1pt)
			1 point	A06.2	Improve Ventilation Effectiveness
			1 point	A07.1	Provide Operable Windows
			1 point	A07.2	Provide Operable Windows
			1 point	A08.1	Install Indoor Air Monitors
			1 point	A08.2	Promote Air Quality Awareness
			1 point	A09.1	Design Healthy Entryways
			1 point	A09.2	Perform Envelope Commissioning
			1 point	A10.1	Manage Combustion
			1 point	A11.1	Manage Pollution and Exhaust
			1 point	A12.1	Implement Particle Filtration
			1 point	A13.1	Improve Supply Air
			1 point	A14.1	Implement Ultraviolet Air Treatment

WELL SCORE CARD

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A01 AIR QUALITY P		VERIFICATION METHOD
PART 1: Meet Thresholds for Particulate Matter <ul style="list-style-type: none"> ▪ PM 2.5 ▪ PM 10 		Performance Test, Technical Document
PART 2: Meet Thresholds for Organic Gases <ul style="list-style-type: none"> ▪ Benzene ▪ Formaldehyde ▪ Toluene 		Performance Test, Technical Document
PART 3: Meet Thresholds for Inorganic Gases <ul style="list-style-type: none"> ▪ Carbon monoxide ▪ Ozone 		Performance Test
PART 4: Meet Thresholds for Radon		Technical Document, Letter of Assurance by Engineer
PART 5: Monitor Air Parameters		On-going Data Report



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A02 SMOKE FREE ENVIRONMENT P	
<p>Issue</p> <p>Exposure to tobacco smoke has continued to detrimentally affect the health of both smokers and those exposed to secondhand smoke. Average life expectancy of a smoker is 10 years less than that of a nonsmoker.</p> <p>Intent</p> <p>Deter smoking, minimize occupant exposure to secondhand smoke and reduce smoke pollution</p> <p>Summary</p> <p>This WELL feature requires projects to ban indoor smoking and ban or restrict outdoor smoking within its boundaries.</p>	



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A02 SMOKE FREE ENVIRONMENT **P**

Solution

- Implement a 100% smoke-free environment
- projects must also take steps to ensure that smoking is not allowed in the vicinity of:
 - building entrances
 - operable windows
 - building air intakes



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A02 SMOKE FREE ENVIRONMENT **P**

PART 1: Prohibit Indoor Smoking

- Smoking and the use of e-cigarettes is prohibited in interior spaces within the project boundary

PART 2: Prohibit Outdoor Smoking

- Smoking ban within 7.5m (25ft.) of all entrances, operable windows & building air intakes
- Smoking ban on all decks, patios, balconies, rooftops & other regularly occupied exterior building spaces
- Signs on the hazards of smoking placed along all walkways with a distance of not more than 30m (100ft) between signs.

Other Spaces – Core & Shell Projects- projects must meet these requirements in the whole building

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A02 SMOKE FREE ENVIRONMENT

P



	VERIFICATION METHOD
PART 1: Prohibit Indoor Smoking	Policy and/or Operations Schedule
PART 2: Prohibit Outdoor Smoking	On-site Photographs, Letter of Assurance by Owner

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A03 VENTILATION DESIGN

P



Issue

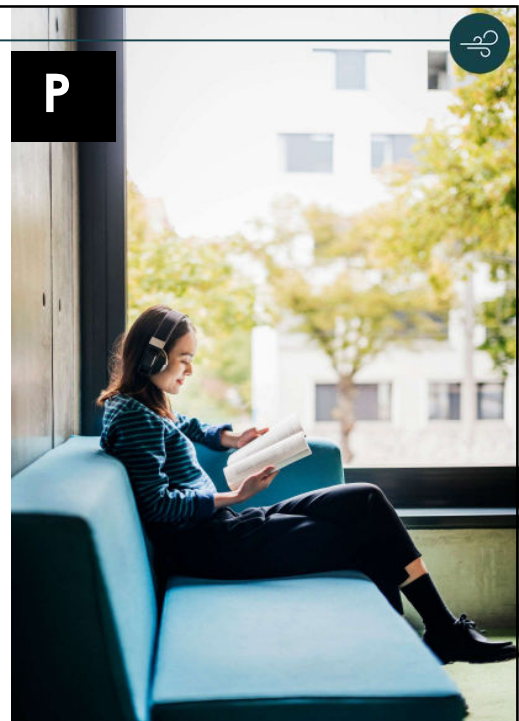
- Poorly ventilated spaces contribute to symptoms, such as headache, fatigue and also;
 - increased rates of employee absences,
 - higher operational costs for businesses
 - decreased productivity in students

Intent

Minimize indoor air quality issues through the provision of adequate ventilation

Summary

This WELL feature requires projects to bring in fresh air from the outside through mechanical and/or natural means in order to dilute human- and product-generated air pollutant



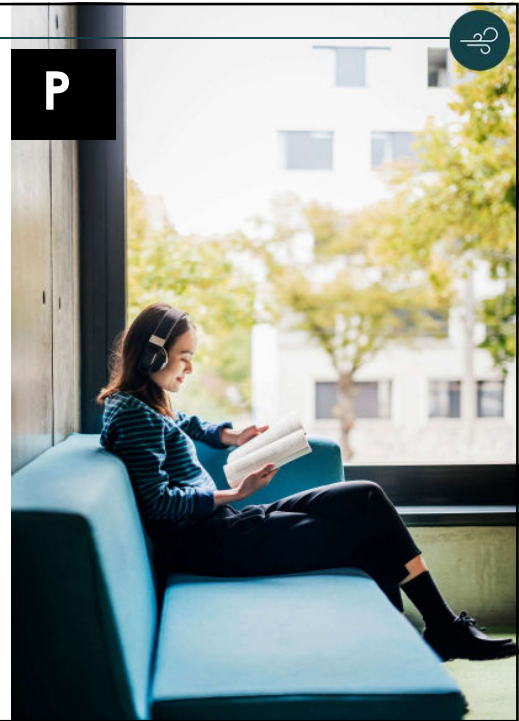
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A03 VENTILATION DESIGN

P

Solution

- Providing sufficient ventilation:
 - proper HVAC system design
 - regular system maintenance
- For naturally ventilated spaces, it is necessary to ensure that adequate outdoor air quality and noise levels are met.



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A03 VENTILATION DESIGN

P

PART 1: Ensure Adequate Ventilation

- Option 1: Mechanically ventilated spaces
 - **Must cover 90% of the project area.**
 1. **ASHRAE 62.1-2010** or any more recent versions (Ventilation Rate Procedure or IAQ Procedure)
 2. **ASHRAE 62.2-2016**
 3. EN 16798-1 (for Category IV buildings)
 4. AS 1668.2-2012 or any more recent version
 5. **CIBSE Guide A: Environmental Design**, version 2007 or any more recent version
 - Existing ventilation systems have been tested and balanced to meet supply and exhaust rates set in one or more ventilation guidelines listed above within the last **five years**

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A03 VENTILATION DESIGN P

PART 1: Ensure Adequate Ventilation

- Option 2: Naturally ventilated spaces
- One or more of the following design criteria, which must describe ventilation rates for at least **90% of the project area**:
 1. **Natural Ventilation Procedure** in ASHRAE 62.1-2010 or any more recent version
 2. **CIBSE** AM10: Natural Ventilation in Non-Domestic Buildings
 3. AS 1668.4-2012 or any more recent version
 4. Any reference in Option 1, which describes natural ventilation procedures
- Vents and windows used to meet the ventilation requirements in one of the standards mentioned above are **permanently open or have controls to prevent their closure during periods of occupancy**.
- Outdoor air meets the following thresholds as an average for the previous year:
 1. PM less than 15 $\mu\text{g}/\text{m}^3$
 2. PM less than 30 $\mu\text{g}/\text{m}^3$

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A03 VENTILATION DESIGN P

PART 1: Ensure Adequate Ventilation

- Option 3: Naturally ventilated spaces in areas with elevated particulate matter
- Same requirements as Option 2
- Outdoor air meets the following thresholds as an average for the previous year:
 1. PM less than 35 $\mu\text{g}/\text{m}^3$
 2. PM less than 70 $\mu\text{g}/\text{m}^3$

limited in WELL Certification level to Silver regardless of total points achieved

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A03 VENTILATION DESIGN

P



PART 1: Ensure Adequate Ventilation	VERIFICATION METHOD
Option 1: Mechanically ventilated spaces	Letter of Assurance by Engineer
Option 2: Naturally ventilated spaces	Letter of Assurance by Engineer, Technical Document
Option 3: Naturally ventilated spaces in areas with elevated particulate matter	

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A04 CONSTRUCTION POLLUTION MANAGEMENT

P



Issue

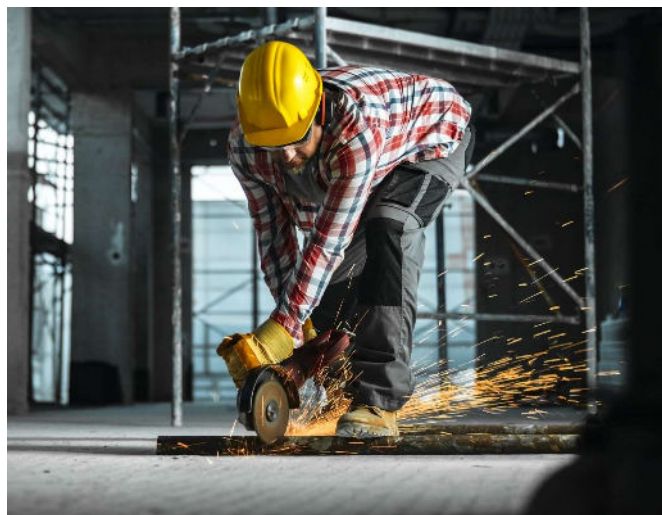
- Air pollution from construction/demolition works can impact the health and quality of life of people working and is associated with increased mortality.
- Increased emissions of PM in the vicinity of construction sites are positively correlated with people's suffering from respiratory diseases.

Intent

Minimize the introduction of construction-related pollutants into indoor air, remediate construction-related indoor air contamination for human health and protect building products from degradation.

Summary

This WELL feature requires projects to protect indoor air quality during building construction and renovation through a combination of strategies.



52

A04 CONSTRUCTION POLLUTION MANAGEMENT



P

Solution

- *Air duct protection, moisture and dust management, filter replacement and proper equipment selection are strategies that improve indoor air quality, by limiting the exposure to an intense contamination period.*



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A04 CONSTRUCTION POLLUTION MANAGEMENT



P

PART 1: Mitigate Construction Pollution

- Ducts **are sealed and protected** from possible contamination during construction.
- Ducts are **cleaned prior** to installing registers, grills and diffusers.
- Media filters with a PM₁₀ **removal rating of at least 70%** (e.g., **MERV 8**) are used to filter return air.
- All filters are replaced **prior to occupancy**.
- Carpets, acoustical ceiling panels, fabric wall coverings, insulation, upholstery and furnishings and other **absorptive materials** are stored separately in a designated area protected from moisture damage.
- All active areas of work are isolated from other spaces by **sealed doorways or windows** or through the use of temporary barriers.
- **Walk-off mats** are used at entryways to reduce the transfer of dirt and pollutants.
- Saws and similar tools use **dust guards** or collectors to capture generated dust.

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A04 CONSTRUCTION POLLUTION MANAGEMENT



	VERIFICATION METHOD
PART 1: Mitigate Construction Pollution	Letter of Assurance by Contractor

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A05 ENHANCED AIR QUALITY



Issue

- An average of 10% of productivity loss could be attributable to health issues related to poor indoor air quality in office buildings.
- It also disrupt physical and cognitive development in children.

Intent

Encourage and recognize buildings with enhanced levels of indoor air quality that promote the health and well-being of people.

Summary

This WELL feature requires projects to go beyond current guidelines to provide enhanced air quality levels that have been linked to improved human health and performance



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A05 ENHANCED AIR QUALITY

Solution

- *Indoor air quality can be properly managed primarily through*
 - *source control strategies,*
 - *passive and active building design*
 - *operation strategies*
 - *human behavior intervention.*
- *High levels of indoor air quality require both professionals and building users to collaborate in the implementation of adequate approaches*



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A05 ENHANCED AIR QUALITY

PART 1: Meet Enhanced Thresholds for Particulate Matter

- PM 2.5
- PM 10

PART 2: Meet Enhanced Thresholds for Organic Gases

- Acetaldehyde
- Acrylonitrile
- Benzene
- Caprolactam
- Formaldehyde
- Naphthalene
- Toluene

PART 3: Meet Thresholds for Inorganic Gases

- Carbon monoxide
- Nitrogen dioxide

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A05 ENHANCED AIR QUALITY

Part 1 Meet Enhanced Thresholds for Particulate Matter

WELL Certification: 2 Pt | WELL Core: 2 Pt

For All Spaces:

The following requirement is met:

- a. Projects comply with the thresholds specified in the table below:

Particulate Matter Thresholds	Points
PM _{2.5} : 12 µg/m ³ or lower. ⁸ PM ₁₀ : 30 µg/m ³ or lower. ⁹	1
PM _{2.5} : 10 µg/m ³ or lower. ⁹ PM ₁₀ : 20 µg/m ³ or lower. ⁹	2

WELL Core Guidance: Meet these requirements in the whole building. Achievement requires access to at least 10% of leased space for testing as identified by the project.



A05 ENHANCED AIR QUALITY

Part 2 Meet Enhanced Thresholds for Organic Gases

WELL Certification: 1 Pt | WELL Core: 1 Pt

For All Spaces:

The following thresholds are met in occupiable spaces:

- a. Acetaldehyde: 140 µg/m³ or lower.¹⁰
- b. Acrylonitrile: 5 µg/m³ or lower.¹⁰
- c. Benzene: 3 µg/m³ or lower.¹⁰
- d. Caprolactam: 2.2 µg/m³ or lower.¹⁰
- e. Formaldehyde: 9 µg/m³ or lower.¹⁰
- f. Naphthalene: 9 µg/m³ or lower.¹⁰
- g. Toluene: 300 µg/m³ or lower.¹⁰

WELL Core Guidance: Meet these requirements in the whole building. Achievement requires access to at least 10% of leased space for testing as identified by the project.



A05 ENHANCED AIR QUALITY

Part 3 Meet Enhanced Thresholds for Inorganic Gases

WELL Certification: 1 Pt | WELL Core: 1 Pt

For All Spaces:

The following thresholds are met:

- a. Carbon monoxide: 7 mg/m³ [6 ppm] or lower.¹¹
- b. Nitrogen dioxide: 40 µg/m³ [21 ppb] or lower.¹¹

WELL Core Guidance:

Meet these requirements in the whole building. Achievement requires access to at least 10% of leased space for testing as identified by the project.

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A05 ENHANCED AIR QUALITY

	VERIFICATION METHOD
PART 1: Meet Enhanced Thresholds for Particulate Matter	Performance Test
PART 2: Meet Enhanced Thresholds for Organic Gases	
PART 3: Meet Thresholds for Inorganic Gases	

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A06 ENHANCED VENTILATION DESIGN

Issue

- Even with proper ventilation designed to meet ventilation standards, the concentration of indoor pollutants can exceed concentrations found in outdoor air.
- Ventilation rates less than 21 cfm(10 L/s) per person in all building types are associated with negative perception of air quality

Intent

Expel internally generated pollutants and improve air quality in the breathing zone through an increased supply of outdoor air or increased ventilation efficiency

Summary

This WELL feature requires implementation of advanced ventilation strategies that can achieve higher air quality levels and thus benefit human health and productivity.



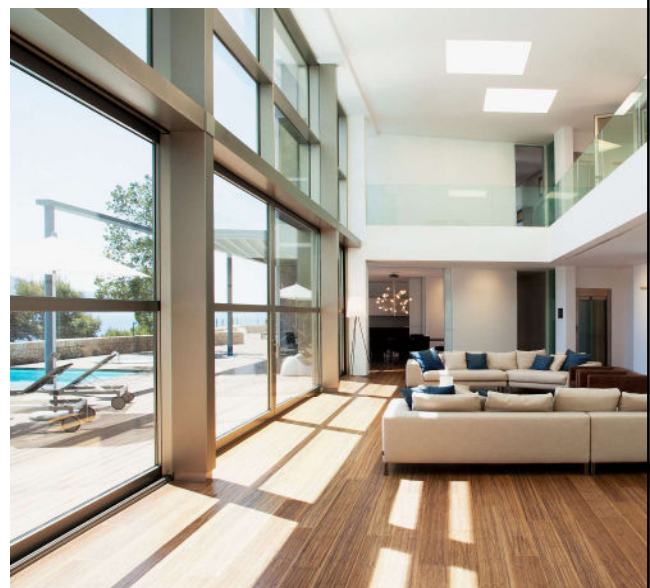
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A06 ENHANCED VENTILATION DESIGN

Solution

- Airflow rate significantly exceeding is needed to minimize sick building syndrome symptoms and to improve human performance and productivity. **CO₂ concentrations < than 800 ppm.**
- Displacement ventilation improves indoor air quality, by:
 - delivering fresh outdoor air at the floor level,
 - leaving warmer polluted indoor air, such as CO to be extracted above the height of the ventilation zone



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A06 ENHANCED VENTILATION DESIGN

PART 1: Increase Outdoor Air Supply

- Option 1: Increased air supply
- Option 2: Demand control ventilation
- Option 3: Enhanced natural ventilation

PART 2: Improve Ventilation Effectiveness

- Option 1: Displacement ventilation system
- Option 2: Personalized ventilation system

Carbon dioxide is measured at the return air diffusers or in the breathing zone at least 3.3 ft(1 m) away from doors, windows, air supply diffusers or occupants.

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A06 ENHANCED VENTILATION DESIGN

Part 1 Increase Outdoor Air Supply

WELL Certification: 2 Pt | WELL Core: 3 Pt

For All Spaces:

Option 1: Increased air supply

For mechanically ventilated projects, the following requirement is met in all occupiable spaces:

- Exceed outdoor air supply rates described in ASHRAE 62.1-2010 by the percentages shown in the table below:

Thresholds	Points
30%	1(2)
60%	2(3)

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A06 ENHANCED VENTILATION DESIGN

Option 2: Demand control ventilation

For mechanically ventilated projects, the following requirements are met in at least 90% of regularly occupied spaces:

- a. A demand-controlled ventilation (DCV) system regulates the outdoor air ventilation rate to keep CO₂ levels less than the thresholds specified in the table below, at the maximum intended occupancy:

Threshold	Threshold	Points	
900 ppm	OR	500 ppm above outdoor levels	1(2)
750 ppm	OR	350 ppm above outdoor levels	2(3)

- b. Carbon dioxide is measured at the return air diffusers or in the breathing zone at least 3.3 ft(1 m) away from doors, windows, air supply diffusers or occupants. At least one sensor is used for each occupancy zone (or per air handling unit, if a single zone is served by multiple air handling units). If the occupancy density/pattern/usage is substantially different in two adjacent areas, each area must be considered a separate zone.

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A06 ENHANCED VENTILATION DESIGN

Option 3: Enhanced natural ventilation

For naturally ventilated projects, the following requirement is met:

- a. Implement an engineered natural ventilation system that is sufficient to keep CO₂ levels in the breathing zone of all regularly occupied spaces below the specified thresholds at the maximum intended occupancies:

Threshold	Threshold	Points	
900 ppm	OR	500 ppm above outdoor levels	1(2)
750 ppm	OR	350 ppm above outdoor levels	2(3)

Note: Mixed-mode projects must select the option corresponding to the ventilation mode (mechanical and natural ventilation) in operation for the majority of operating hours within the year.

WELL Core Guidance: Meet these requirement in the whole building. If the project pursues Option 1 or Option 2, it must provide leased spaces with sufficient outdoor air and a compatible control system (as applicable) but is not required to install ducts and diffusers within leased spaces.

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A06 ENHANCED VENTILATION DESIGN

Part 2 Improve Ventilation Effectiveness

WELL Certification: 1 Pt | WELL Core: 2 Pt

For All Spaces:

Option 1: Displacement ventilation system

The project uses a displacement ventilation system in at least 90% of regularly occupied spaces, with one of the following as a basis for design:

- a. ASHRAE Guidelines RP-949.⁹
- b. ASHRAE 62.1-2019, "Stratified Air Distribution Systems (Section 6.2.1.2.1)."¹⁰
- c. REHVA Guidebook No. 01 (Displacement Ventilation in non-industrial premises).¹¹

OR-----

Option 2: Personalized ventilation system

For at least 50% of workstations, the following requirements are met:

- a. Outdoor air is supplied in the breathing zone, with an airspeed of no greater than 50 fpm(0.25 m/s) at the occupant's head.¹⁰
- b. The return air diffusers are located more than 9.8 ft(2.8 m) above the floor.¹⁰

WELL Core Guidance: Meet these requirements in the whole building.



A06 ENHANCED VENTILATION DESIGN

		VERIFICATION METHOD
PART 1: Increase Outdoor Air Supply		
	Option 1: Increased air supply	Letter of Assurance by Engineer
	Option 2: Demand control ventilation	
	Option 3: Enhanced natural ventilation	Technical Document
PART 2: Improve Ventilation Effectiveness		
	Option 1: Displacement ventilation system	Letter of Assurance by Engineer
	Option 2: Personalized ventilation system	

A07 OPERABLE WINDOWS

Issue

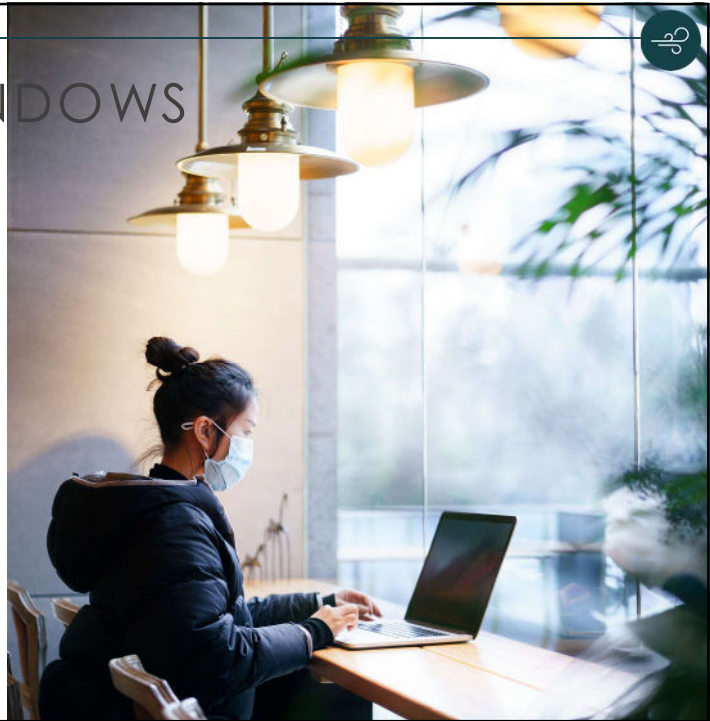
- *Inhalation of harmful indoor substances is correlated with adverse health outcomes.*
- *it is challenging to the ability to maintain strict control over interior air quality.*

Intent

Increase the supply of high-quality outdoor air and promote a connection to the outdoor environment, by encouraging building users to open windows when outdoor air quality is acceptable.

Summary

This WELL feature requires buildings with operable windows to increase the supply of high-quality outdoor air and promote a connection to the outdoor environment.



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A07 OPERABLE WINDOWS

Solution

- *When weather and local outdoor parameters indicate high-quality outdoor air, people should be encouraged to make use of natural ventilation strategies.*
- *ventilating through windows generally introduces more outdoor pollution than mechanical systems with filters.*
- *Educating and informing building users when outdoor conditions are favorable for window opening, can reduce the generation and persistence of indoor air pollutants.*



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A07 OPERABLE WINDOWS

PART 1: Provide Operable Windows

- At least 75% of the regularly occupied spaces have operable windows that provide access to outdoor air
- For each floor, the operable window area is at least 4% of the net occupiable floor area

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A07 OPERABLE WINDOWS

PART 2: Manage Window Use (*Projects may only achieve this part if Part 1 is also achieved*)

- Option 1: Outdoor air measurement
 - Outdoor levels of PM, temperature and humidity are monitored at intervals of at least once per hour, based on a data-gathering station located within 2.5 mi (4 km) of the building.
- Option 2: Window operation
 - Indicator lights at windows (at least one per room with windows) cue occupants when the conditions outside are suitable for opening windows:
 - a. PM : 15 $\mu\text{g}/\text{m}^3$ or lower
 - b. Dry-bulb temperature: within 15 °F (8 °C) of indoor air temperature setpoint
 - c. Relative Humidity: 65% or lower

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A07 OPERABLE WINDOWS

		VERIFICATION METHOD
PART 1: Provide Operable Windows		On-site Photographs, Letter of Assurance by Designer
PART 2: Manage Window Use		
	Option 1: Outdoor air measurement	Professional Narrative
	Option 2: Window operation	On-site Photographs, Letter of Assurance by Engineer

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A08 AIR QUALITY MONITORING AND AWARENESS

Issue

- Types and concentrations of indoor pollutants continuously fluctuate in any indoor or outdoor environment such as:
 - Cooking in home
 - urban rush hours and waste burning

Intent

Monitor indoor air quality issues, as well as inform and educate individuals on the quality of the indoor environment

Summary

This WELL feature requires the ongoing measurement of contaminant data to educate and empower occupants about their environmental quality.



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A08 AIR QUALITY MONITORING AND AWARENESS

Solutions

- Installation of air quality sensors and detectors in every building
- real-time monitoring is necessary to promptly fix any deviations in indoor quality metric
- robust and calibrated sensors
- educating occupants about the risks associated with elevated air pollutant exposures



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A08 AIR QUALITY MONITORING AND AWARENESS

PART 1: Install Indoor Air Monitors

- Option 1: Sensor requirements
 - PM_{2.5} or PM₁₀
 - Carbon dioxide
 - Carbon monoxide
 - Ozone
 - Nitrogen dioxide
 - Total VOCs
 - Formaldehyde
- Option 2: Reporting & maintenance
 - Data are submitted annually through the WELL digital platform
 - Monitors are recalibrated or replaced annually

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A08 AIR QUALITY MONITORING AND AWARENESS

PART 2: Promote Air Quality Awareness

- Data are presented through:
 - Display Screens **(3.6–5.6) , one display per 3500 square feet**
 - Website or Phone Applications
- Data presented include:
 - Concentrations of the parameters measured
 - Qualitative results of air quality

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A08 AIR QUALITY MONITORING AND AWARENESS

		VERIFICATION METHOD
PART 1: Install Indoor Air Monitors		
	Option 1: Sensor requirements	On-site Photographs, Letter of Assurance by Engineer
	Option 2: Reporting & maintenance	On-going Data Report
PART 2: Promote Air Quality Awareness		On-site Photographs, Letter of Assurance by Owner

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A09 POLLUTION INFILTRATION MANAGEMENT

Issue

- Exposure to high levels of coarse and fine particulate matter inadvertently introduced into the space can lead to respiratory irritation.
- Indoor air quality and thermal comfort can be compromised by leaks and gaps that break the building's air barrier.

Intent

Minimize the introduction of pollutants into indoor air through the building envelope and at building entrances

Summary

This WELL feature requires projects to reduce transmission of air and pollutants from outdoors to indoors through the building envelope and entrance



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A09 POLLUTION INFILTRATION MANAGEMENT

Solution

- The installation of entryway walk-off systems and/or entryway air seals at all main building entrances



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A09 POLLUTION INFILTRATION MANAGEMENT

PART 1: Design Healthy Entryways

- Option 1: Building entry design
- Option 2: Building entry maintenance
- Option 3: Outdoor sport areas

PART 2: Perform Envelope Commissioning

- The commissioning process includes envelope commissioning for air infiltration and leakage, which is reflected in the specification and commissioning plan

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A09 POLLUTION INFILTRATION MANAGEMENT

Part 1 Design Healthy Entryways

WELL Certification: 1 Pt | WELL Core: 2 Pt

For All Spaces:

Option 1: Building entry design

The following requirements are met:

- a. All regularly used entrances to the building that open to a pedestrian network include an entryway system composed of grilles, grates, slots or rollout mats or removable carpet tiles that are **at least the width of the entrance and 10 ft(3 m) long in the primary direction of travel** (sum of indoor and outdoor length).⁷
- b. One of the below is in place to slow the movement of air from outdoors to indoors:
 1. **Building entry vestibule with two typically closed doorways.**
 2. **Revolving entrance doors.**

Option 2: Building entry maintenance

Building entryway systems are cleaned, as follows:

- a. **Wet-cleaned at least once a week**, or as instructed by manufacturer.
- b. **Vacuumed at least once a day**, or as instructed by manufacturer.

Option 3: Outdoor sport areas

The following requirement is met:

- a. All facilities adjacent to an outdoor sports field have a staging area that separates the playing field from other internal areas to capture moisture and debris.⁸

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A09 POLLUTION INFILTRATION MANAGEMENT

Part 2 Perform Envelope Commissioning

WELL Certification: 1 Pt | WELL Core: 2 Pt

For All Spaces:

For projects undergoing design and construction, the following requirements are met:

- a. The project uses a façade engineer that is responsible for defining the building envelope performance metrics (including materials, components, assemblies and systems) at the concept design stage.
- b. The building envelope performance requirements are included in the Basis of Design document and reflect the Owner's Project Requirements.
- c. The commissioning process includes envelope commissioning for air infiltration and leakage, which is reflected
- d. The **envelope commissioning** process is executed, as outlined in the commissioning plan.
- e. The envelope commissioning plan is included in the project Operation & Maintenance (O&M) Manual.

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A09 POLLUTION INFILTRATION MANAGEMENT

		VERIFICATION METHOD
PART 1: Design Healthy Entryways		
	Option 1: Building entry design	On-site Photographs, Letter of Assurance by Designer
	Option 2: Building entry maintenance	Policy and/or Operations Schedule
	Option 3: Outdoor sport areas	On-site Photographs, Letter of Assurance by Designer
PART 2: Perform Envelope Commissioning		Technical Document

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A10 COMBUSTION MINIMIZATION

Issue

- Combustion-related emissions, mostly from space heating, cooking and nearby transportation, are often a major and overlooked source of indoor air pollution.
- Inefficient heating practices, cooking or other combustion activities produce high levels of indoor air pollution

Intent

Reduce human exposure to combustion-related air pollution from heating and transportation sources.

Summary

This WELL feature requires projects to utilize low-emission combustion products or eliminate combustion-based products entirely.



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A10 COMBUSTION MINIMIZATION

Solution

- Opting for non-combustion or low-emission combustion products is an important first step toward the reduction of carbon monoxide, nitrogen dioxide, small particles and other combustion by-products in the air



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A10 COMBUSTION MINIMIZATION

PART 1: Manage Combustion

- Option 1: Appliance and heater combustion ban
 - **Combustion-based fireplaces, stoves, space heaters, ranges and ovens are not used in occupiable space**
- Option 2: Low-emission combustion sources
 - *Comply with California's South Coast Air Quality Management District (SCAQMD) emission rules for pollution.*
 - *Are electric.*
 - *Are supplied by district heating or cooling.*
- Option 3: Engine exhaust reduction
 - *Vehicle engine idling for more than 30 seconds is prohibited*

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A10 COMBUSTION MINIMIZATION

		VERIFICATION METHOD
PART 1: Manage Combustion		
	Option 1: Appliance and heater combustion ban	On-site Photographs, Letter of Assurance by Owner
	Option 2: Low-emission combustion sources	Letter of Assurance by Engineer
	Option 3: Engine exhaust reduction	On-site Photographs, Letter of Assurance by Owner

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A11 SOURCE SEPARATION

Issue

- Chemical storage closets can be a source of harmful vapors, including Volatile Organic Compounds (VOCs) that are linked to cancer, organ and central nervous system damage
- Copy rooms can contribute to the production of ozone that causes lung inflammation chest pain and asthma.

Intent

Preserve indoor air quality and maximize olfactory comfort in occupied spaces through the isolation and proper ventilation of indoor pollution sources and chemical storage areas.

Summary

This WELL feature requires strategies that isolate key sources of odors, germs, pollution or humidity through doors or dedicated exhaust.



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A11 SOURCE SEPARATION

Solution

- Eliminate individual sources or capture emissions at the source, before they spread to surroundings.
- For air pollution sources that are inevitable, physical separation of such sources combined with direct ventilation exhaust systems is an effective means of protecting individuals.



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A11 SOURCE SEPARATION

PART 1: Manage Pollution and Exhaust

For All Spaces except Dwelling Units:

- Are separated from all adjacent regularly occupied spaces with self-closing doors and/or vestibules (OR) Are negatively pressurized compared with adjacent regularly occupied spaces
- Utilize exhaust fans such that the return air is vented outdoors and not recirculated

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A11 SOURCE SEPARATION

PART 1: Manage Pollution and Exhaust

For Commercial Kitchen Spaces:

- Canopy hoods have side or partial panels, when allowable by code.
- Type II hood overhangs comply with ASHRAE 154-2011
- The vertical distance between the front lower lip of the hood and the cooking surface is less than or equal to 4 ft (1.2 m).
- Makeup air velocity near (or directed at) the hood is less than 75 fpm (0.38 m/s).
- Replacement air introduced directly into the exhaust hood cavity does not exceed 10% of the hood exhaust airflow rate.
- At least 50% of the air that replaces the exhaust air is conditioned transfer air, rather than makeup air.
- Appliances are grouped under exhaust hoods according to effluent production and associated ventilation requirements, as specified in ASHRAE 154-2011
- Appliances have a rear seal between the appliance and the wall
- Appliances located at the end of a cook line requiring exhaust airflow rates greater than 300 cfm/ft

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A11 SOURCE SEPARATION

PART 1: Manage Pollution and Exhaust

For Dwelling Units:

- Exhaust air is vented directly to the outdoors.
- Exhaust air outlets are separated from any air intakes by at least 10 ft(3 m), unless otherwise specified by local code.
- The minimum operating exhaust airflow rate is the greater of 100 cfm per linear foot(150 L/s per linear meter) of range hood width or 200 cfm(94 L/s).
- **The range hood device, when in operation, covers at least 75% of the burner area**

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A11 SOURCE SEPARATION

		VERIFICATION METHOD
PART 1: Manage Pollution and Exhaust		
	For All Spaces except Dwelling Units	Technical Document
	For Commercial Kitchen Spaces	On-site Photographs, Letter of Assurance by Engineer

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A12 AIR FILTRATION

Issue

- Exposure to particulate matter (PM) is associated with many negative health outcomes
- PM can block and inflame airways, causing a range of respiratory-related conditions that can lead to illness or death

Intent

Reduce indoor and outdoor airborne contaminants through air filtration

Summary

This WELL feature requires projects with mechanically ventilated spaces to implement adequate air filtration and document a maintenance protocol for installed filter



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A12 AIR FILTRATION

Solution

- Selection and installation of adequate media filters.
- Filtration of recirculated indoor
- Regular filter maintenance is critical to ensure proper air filtration and the efficiency of the air conditioning system
- Avoid Overloaded filters



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A12 AIR FILTRATION

PART 1: Implement Particle Filtration

- Option 1: Filtration levels
 - Media filters are used in the ventilation system to filter outdoor air supplied to the space
- Option 2: Filter maintenance
 - Evidence that the filter has been replaced according to the manufacturer's recommendation is submitted annually through the WELL digital platform

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A12 AIR FILTRATION

Part 1 Implement Particle Filtration

WELL Certification: 1 Pt | WELL Core: 2 Pt

For All Spaces:

Option 1: Filtration levels

The following requirement is met:

- a. Media filters are used in the ventilation system to filter outdoor air supplied to the space, in accordance with thresholds specified in the table below.^{5,6}

Annual Average Outdoor PM _{2.5} Threshold	Minimum Air Filtration Level (PM _{2.5} removal)
23 µg/m ³ or less	≥80% (e.g., MERV 12 or M6)
24–39 µg/m ³	≥90% (e.g., MERV 14 or F8)
40 µg/m ³ or greater	≥95% (e.g., MERV 16 or E10)

Option 2: Filter maintenance

The following requirement is met:

- a. Evidence that the filter has been replaced according to the manufacturer's recommendation is submitted annually through the WELL digital platform.

WELL Core Guidance: Meet these requirements in the whole building. Up to 10% of the total area occupied by tenants can be excluded from the feature scope.

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A12 AIR FILTRATION

		VERIFICATION METHOD
PART 1: Implement Particle Filtration		
	Option 1: Filtration levels	On-site Photographs, Letter of Assurance by Engineer
	Option 2: Filter maintenance	On-going Maintenance Report

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A13 ENHANCED SUPPLY AIR

Issue

Building materials, furnishings (e.g., carpets and furniture finishes), fabrics, cleaning products, personal care products, adhesives, solvents and air fresheners can all emit VOCs or semi-volatile organic compounds (SVOCs) into the indoor environment

Intent

Mitigate risks from indoor contamination and pollution sources, such as infectious disease particles and volatile organic compounds (VOC)'.

Summary

This WELL feature requires the projects to use supply air that is not recirculated or that is treated with carbon filters, media filters and/or Ultraviolet Germicidal Irradiation (UVGI)



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A13 ENHANCED SUPPLY AIR

Solution

- Avoid recirculation of contaminated air
- Use HEPA or near-HEPA filters to help remove virus particles
- UVGI systems – Upper portion of the room and air ducts
- In-room air purifiers can be beneficial
- Air filtration systems maintenance



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A13 ENHANCED SUPPLY AIR

PART 1: Improve Supply Air

- Option 1: Air supply requirements
 - 100% outdoor air (No recirculation)
 - Partially recirculated air
 - Activated carbon filter
 - MERV 14 - PM_{2.5} removal of $\geq 90\%$
 - UVGI within the ducts to treat the moving air
 - Upper-room UVGI
 - Partially recirculated air + air purification/cleaning devices
 - Activated carbon filter
 - MERV 14 - PM_{2.5} removal of $\geq 90\%$ OR UVGI

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A13 ENHANCED SUPPLY AIR

PART 1: Improve Supply Air

- Option 2: Filter maintenance
 - Evidence that the filter has been replaced according to the manufacturer's recommendation is submitted annually through the WELL digital platform

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A13 ENHANCED SUPPLY AIR

		VERIFICATION METHOD
PART 1: Improve Supply Air		
	Option 1: Air supply requirements	On-site Photographs, Letter of Assurance by Engineer
	Option 2: Filter maintenance	On-going Maintenance Report

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A14 MICROBE AND MOLD CONTROL

Issue

- Mold will grow in places with an acceptable temperature range, a nutrient source and sufficient moisture.
- Air conditioner systems – specifically cooling coils
- Mold effects hypersensitivity pneumonitis, allergic rhinitis, bronchitis, lung tumor development, eczema and toxic mold syndrome

Intent

Reduce mold and bacteria growth within the building mechanical system

Summary

This WELL feature requires projects to utilize UVGI systems and/or conduct regular inspections on components of the cooling system to reduce or eliminate growth of microbes and mold



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A14 MICROBE AND MOLD CONTROL

Solution

Prevention is better than cure.

- Periodic inspections and maintenance of cooling systems are good **preventative** methods.
- Regular mold inspections.
- Placement of microbe inactivation techniques, such as Ultraviolet Germicidal Irradiation (UVGI) systems.



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A14 MICROBE AND MOLD CONTROL

PART 1: Implement Ultraviolet Air Treatment

- Option 1: UV system design
 - Use of ultraviolet lamps to irradiate the surfaces of the cooling coils and drain pans
- Option 2: UV system maintenance and inspection
 - Evidence that the ultraviolet lamps have been replaced or maintained, according to manufacturer's recommendation is submitted annually through the WELL digital platform.
 - All cooling coils without ultraviolet lamps (if applicable) are inspected on a quarterly basis for mold growth and cleaned. If necessary, dated photos demonstrating adherence are submitted annually through the WELL digital platform.

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A14 MICROBE AND MOLD CONTROL

		VERIFICATION METHOD
PART 1: Implement Ultraviolet Air Treatment		
	Option 1: UV system design	On-site Photographs, Letter of Assurance by Engineer
	Option 2: UV system maintenance and inspection	On-going Maintenance Report

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AIR CONCEPT

P



Our Project - Strategies

- Measurement and Monitoring IAQ through sensors
- Meet the threshold requirements
- Ventilation rate
- Natural Ventilation
- More Outside Air
- Avoid air recirculation
- Airflow direction
- Filtration
- Air Cleaners
- Exhaust Fans
- UVGI
- Operations/Maintenance

AIR				0 POINTS	
Y	?	N	Weight	ID	Part Name
Y			Required	A01.1	Meet Thresholds for Particulate Matter
Y			Required	A01.2	Meet Thresholds for Organic Gases
Y			Required	A01.3	Meet Thresholds for Inorganic Gases
Y			Required	A01.4	Meet Thresholds for Radon
Y			Required	A01.5	Monitor Air Parameters
Y			Required	A02.1	Prohibit Indoor Smoking
Y			Required	A02.2	Prohibit Outdoor Smoking
Y			Required	A03.1	Ensure Adequate Ventilation
Y			Required	A04.1	Mitigate Construction Pollution
			2 points	A05.1	Meet Enhanced Thresholds for Particulate Matter
			1 point	A05.2	Meet Enhanced Thresholds for Organic Gases
			1 point	A05.3	Meet Enhanced Thresholds for Inorganic Gases
			2 points	A06.1	Increase Outdoor Air Supply (30% 1pt)
			1 point	A06.2	Improve Ventilation Effectiveness
			1 point	A07.1	Provide Operable Windows
			1 point	A07.2	Provide Operable Windows
			1 point	A08.1	Install Indoor Air Monitors
			1 point	A08.2	Promote Air Quality Awareness
			1 point	A09.1	Design Healthy Entryways
			1 point	A09.2	Perform Envelope Commissioning
			1 point	A10.1	Manage Combustion
			1 point	A11.1	Manage Pollution and Exhaust
			1 point	A12.1	Implement Particle Filtration
			1 point	A13.1	Improve Supply Air
			1 point	A14.1	Implement Ultraviolet Air Treatment

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GBRI Community Center SCORE CARD

AIR				0 POINTS	
Y	?	N	Weight	ID	Part Name
Y			Required	A01.1	Meet Thresholds for Particulate Matter
Y			Required	A01.2	Meet Thresholds for Organic Gases
Y			Required	A01.3	Meet Thresholds for Inorganic Gases
Y			Required	A01.4	Meet Thresholds for Radon
Y			Required	A01.5	Monitor Air Parameters
Y			Required	A02.1	Prohibit Indoor Smoking
Y			Required	A02.2	Prohibit Outdoor Smoking
Y			Required	A03.1	Ensure Adequate Ventilation
Y			Required	A04.1	Mitigate Construction Pollution
			2 points	A05.1	Meet Enhanced Thresholds for Particulate Matter
			1 point	A05.2	Meet Enhanced Thresholds for Organic Gases
			1 point	A05.3	Meet Enhanced Thresholds for Inorganic Gases
			2 points	A06.1	Increase Outdoor Air Supply (30% 1pt)
			1 point	A06.2	Improve Ventilation Effectiveness
			1 point	A07.1	Provide Operable Windows
			1 point	A07.2	Provide Operable Windows
			1 point	A08.1	Install Indoor Air Monitors
			1 point	A08.2	Promote Air Quality Awareness
			1 point	A09.1	Design Healthy Entryways
			1 point	A09.2	Perform Envelope Commissioning
			1 point	A10.1	Manage Combustion
			1 point	A11.1	Manage Pollution and Exhaust
			1 point	A12.1	Implement Particle Filtration
			1 point	A13.1	Improve Supply Air
			1 point	A14.1	Implement Ultraviolet Air Treatment

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Knowledge Domain 1: Air

Knowledge of:

1. Types, sources and acceptable thresholds of indoor air contaminants.
2. Short- and long-term effects of indoor air quality on human health, well-being and productivity.
3. Design, construction and operational processes that affect air quality throughout the lifecycle of buildings.
4. Strategies for addressing and monitoring indoor air quality.

Skills In:

1. Analyzing the air quality results from on-site monitoring and laboratory-based tests to inform decision-making.
2. Recommending strategies to prohibit smoking, minimizing occupant exposure to secondhand smoke and reducing smoke pollution.
3. Recommending strategies for mechanical and natural ventilation to dilute human- and product-generated air pollutants.
4. Recommending strategies to mitigate the introduction of construction related pollutants into indoor air and remediating construction-related indoor air contamination.
5. Recommending strategies that limit sources of air pollution such as combustion, and isolating key sources of odors, germs, pollution or humidity.
6. Recommending strategies to mitigate risks from indoor contamination and pollution sources.

