HEALTHY BUILDINGS

RESET

STANDARD

Air

STANDARD

FOR
CORE & SHELL v2.0

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2.4.0 Preface

RESET™ Air for Core & Shell is a continuous monitoring and communication standard for indoor air quality that defines monitor deployment, installation, performance, maintenance and reporting requirements. Core and shell projects become **RESET™ Air** Certified when operational performance targets are achieved. The **RESET™ Air for Core & Shell** Standard can be applied to new or existing buildings.

Intent:

- Continuously monitor the quality of air being delivered by the project's mechanical (HVAC) system.
- Monitor and report levels of particulate matter (PM2.5), CO_2, and TVOC in the outdoor air and the supply air (including recirculated air) that affects the project.
- Report the data to project occupants to foster education and promote social equity.
- Standardize how a building's air quality performance is measured and communicated, thereby protecting occupants from false claims and help create a level playing field for building owners and operators.
- Raise public awareness of indoor air quality and its impact on environmental and occupant health.

Note: The intent is **not** to indicate the quality of mixed air breathed by individuals within tenant spaces and/or public occupant spaces. Air quality within those spaces is covered by **RESET™ Air for Commercial Interiors** (Section 2.2).

2.4.1 Certification Approach

RESET™ Air for Core & Shell is a performance-based standard. Its intent is to monitor, track, and report the quality of the air being provided by the project's mechanical (HVAC) system.

Given the wide variety of mechanical systems and air delivery designs engineered for the built environment, applying a prescriptive methodology across all projects would be ineffective.

Influencing factors such as project location, orientation, climate, age of both the structure and equipment, use type, and zoning calculations have resulted in a wide array of engineered solutions and mechanical (HVAC) systems. Mandating a prescriptive methodology be applied to every project would potentially result in inaccurate calculations.

RESET™ Air for Core & Shell employs a non-prescriptive approach for certification. Project teams must define and defend their calculation methodologies based on their individual project(s) and respective mechanical (HVAC) systems.

Refer to **RESET™ Air Certification Process for Core & Shell** (Section 2.5) for documentation requirements.

2.4.2 Indoor Air Quality Performance Targets

RESET™ Air for Core & Shell is a performance-based building standard. In order for a project to achieve **RESET™ Air Certification for Core & Shell**, indoor air quality parameters, as tracked through continuous monitoring, must be maintained within the limits listed below.

Daily averages are calculated from hours of occupancy and are compared against international IAQ health limits. To qualify for initial certification, results from indoor air monitors must not exceed required limits for a minimum of 3 continuous months (3 audit cycles). Refer to **RESET™ Air Methodology for Data Analysis** (Section 2.9) document for more information.

PM2.5 Particulate Matter	TVOC Total Volatile Organic Compounds	CO_2 Carbon Dioxide	Temp Temperature	RH Relative Humidity
Required ≤ 12 µg/m³ or ≥ 75% Reduction*	**Required** < 400 µg/m³	**Required** < 800 ppm	**Monitored**	**Monitored**
			*Although there are no requirements for temperature and humidity under **RESET™ Air**, both must be monitored given their impact on sensor readings for PM2.5 and TVOC.*	

** When outdoor PM2.5 is ≤48µg/m³, indoor levels can be no more than 12µg/m³. When outdoor PM2.5 is >48µg/m³, filtration at the level of the air handling unit must remove 75% of PM2.5 at a minimum.*

2.4.2.1 IAQ Performance Targets - PM2.5

Particulate matter 2.5 (PM2.5) refers to particles with diameter 2.5 μm or less. Exposure to a high index of PM2.5 can cause diseases in respiratory and cardiovascular systems.

PM2.5 Target Requirement:

a. When outdoor PM2.5 is ≤48μg/m^3, indoor levels do not exceed 12 μg/m^3.

b. When outdoor PM2.5 is >48 μg/m^3, filtration installed within the HVAC system must remove at minimum 75% of PM2.5 from the supply air.

2.4.2.2 IAQ Performance Targets - TVOC

Volatile organic compounds (VOCs) are organic compounds that easily become vapors or gases. Common VOCs include formaldehyde, benzene, and toluene. Long-term exposure to VOCs can cause damage to the liver, kidneys, and the central nervous system.

TVOC Target Requirement:

a. The indoor TVOC levels do not exceed 400 µg/m^3.

2.4.2.3 IAQ Performance Targets - CO_2

Carbon Dioxide (CO_2) concentration has a direct impact on productivity and comfort. Elevated CO_2 levels lead to drowsiness, dizziness, and cognitive disfunction.

CO_2 Target Requirement:

a. The indoor CO_2 levels do not exceed 800 ppm.

2.4.3 Data Analysis Algorithm

RESET™ Air for Core & Shell uses a multi-tier algorithm to parse through data submitted to the **RESET™ Assessment Cloud** for data analysis. The **RESET™ Assessment Cloud** is **RESET™**'s data analysis platform.

The data analysis algorithm compiles daily averages calculated from hours of occupancy and compares it against the indoor air quality limits in **RESET™ Air for Core & Shell's Indoor Air Quality Performance Targets** (Section 2.4.2).

To qualify for initial certification for **RESET™ Air for Core & Shell**, results from the data analysis must not exceed acceptable limits for a period of 3 consecutive months.

Refer to **RESET™ Air Data Analysis Methodology** (Section 2.9) for more information.

2.4.4 Data Provider Requirements

Data Providers are responsible for collecting and aggregating IAQ data according to **RESET™** requirements. The required data is to be collected and transferred to the **RESET™ Assessment Cloud** for assessment purposes.

Outdoor and indoor air quality data must report to the RESET™ Assessment Cloud:

a. Projects must use a **RESET™ Air Accredited Data Provider** (Section 2.8) that reports to the **RESET™ Assessment Cloud**.

Air quality data must be displayed to project occupants:

b. **RESET™ Air** projects must provide project occupants access to hourly indoor air quality data. Project occupants include tenants, employees (full and part-time as well as maintenance and cleaning staff), guests and visitors who at any time occupy the project for more than one hour per day.
c. Acceptable methods of data access include, visual display screens in public, community or shared work areas, phone apps, web apps, graphic signage with http address or QR code that directly connects users to the app or website where the data can be viewed.

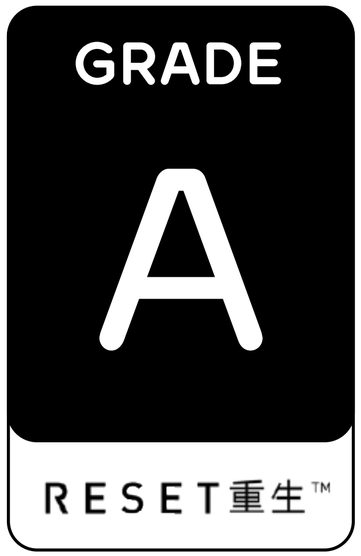
For more information, please refer to **RESET™ Air Accredited Data Providers** (Section 2.8).

2.4.5 Monitor Requirements

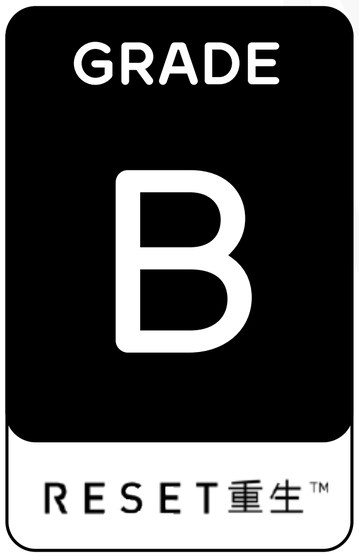
RESET™ Air requires continuous monitoring of regularly occupied spaces. The accuracy of air quality monitors is of critical importance to determine how IAQ is impacting occupant health and to appropriately guide HVAC operations and maintenance. Market-available monitors range widely in quality, accuracy and reliability, therefore, **RESET™ Air** sets standards for sensor performance, maintenance, and calibration.

Only Grades A & B are acceptable for use in RESET™ Air Projects. Grade C are not acceptable.

Refer to the **RESET™ Air Accredited Monitor Standard** (Section 2.6) for full requirements.



Calibration grade monitors



Commercial grade monitors

Consumer grade monitors

2.4.6 Monitor Installation Requirements

In order to certify for **RESET™ Air for Core & Shell**, projects must be able to demonstrate that the building's mechanical (HVAC) system delivers air to building occupants adhering to the **RESET™ Air** performance targets.

In order to do so, a baseline must be established via outdoor air quality monitoring. Indoor air quality monitors are then "paired" with the outdoor air monitors so that the aggregated data can be used for comparison purposes.

2.4.6.1 Monitor Installation Requirements Outdoor Air Monitors

Outdoor air monitoring is used to establish an outdoor air quality baseline for comparison against the building's indoor air quality.

Outdoor monitors must be installed according to the following requirements:

a. **Required monitor parameters**
RESET™ Air Accredited Monitors (Section 2.6) reporting PM2.5, CO_2, Temperature, and Relative Humidity.

b. **Installation distance from air intake**
Monitor must be located within 5 meters (16 feet) of air intake.

c. **Pre-Filtration and Pre-Mixing**
Monitor is to be Installed at a location that is pre-filtration and pre-mixing.

2.4.6.1 Monitor Installation Requirements Outdoor Air Monitors

d. **Building size scenarios**
For a project consisting of 10 stories or less and designed with only one (1) outdoor air intake, one (1) outdoor monitor must be deployed at the air intake.

For a project consisting of 10 stories or less and designed with more than one (1) outdoor air intake, one (1) outdoor monitor must be deployed at the air intake that the project team deems representative of the poorest outdoor air conditions of the project.

For a project consisting of 11 stories or more and designed with only one (1) outdoor air intake, one (1) outdoor monitor must be deployed at the air intake.

For a project consisting of 11 stories or more and designed with more than one (1) outdoor air intake, one (1) outdoor monitor must be deployed at the lowest air intake and one (1) outdoor monitor must be deployed at the highest air intake. If intake locations are neither higher nor lower, deploy one (1) monitor at the centrally-located air intake.

2.4.6.2 Monitor Installation Requirements Indoor Air Monitors

Indoor monitor deployment is based on a project's total air volume; the sum of air volume designed by the mechanical (HVAC) system to be delivered to all occupied spaces within the project boundary.* Mechanical (HVAC) systems that are not designed with constant air volume (CAV), but use variable air volume (VAV) or similar, must calculate total air volume based on the highest capacity airflow for which the system is designed.

To achieve **RESET™ Air for Core & Shell**, at least 30% of the total air volume must be monitored.

Indoor monitors must be installed according to the following requirements:

a. **Required monitor parameters**
RESET™ Air Accredited Monitors (Section 2.6) reporting PM2.5, CO_2, TVOC, Temperature, and Relative Humidity.

b. **Post-Filtration and Post-Mixing**
Monitors must be installed post-filtration and post-mixing. If there is no air mixing in the HVAC system, then post-filtration is enough.

** Office tower lobbies are exempt from this requirement and are not required to be included in the total volume calculation.*

2.4.6.2 Monitor Installation Requirements Indoor Air Monitors

c. **Air Flow**
Monitors are to be installed prior to dampers that may limit airflow to a branch of (a) supply duct(s).

d. **Pairing with outdoor monitors**
Every outdoor air monitor must be "paired" with an indoor air monitor. This "pairing" of indoor monitors to outdoor monitors is required until all outdoor monitors are paired.

e. **Monitoring 30% of total air volume**
30% of total air volume must be monitored by indoor air monitoring. If one (1) indoor monitor is sufficient to meet the 30% requirement; only one monitor is required to be paired with an outdoor monitor location of the team's choosing. If additional indoor monitors are necessary in order to meet the 30% requirement, they must be deployed evenly across the mechanical system delivering the 30% volume of air to the project.

2.4.7 Steps for Outdoor & Indoor Monitor Deployment

The following section provides a step-by-step process to determine monitor deployment for a **RESET™ Air for Core & Shell Project**. Below is the list of steps:

1. **Step One**
   Define the project boundary

2. **Step Two**
   Deploy outdoor monitors according to project type

3. **Step Three**
   Calculate the project's total air volume based on mechanical system design

4. **Step Four**
   Calculate 30% of the project's total air volume

5. **Step Five**
   Deploy and pair indoor monitor locations to outdoor monitors

6. **Step Six**
   Deploy additional indoor monitors if applicable.

2.4.7.1 Step One
Define Project Boundary

1. **Define the project boundary.**

For Core and Shell, a project boundary is based upon a building's mechanical system. The project boundary must include all mechanical systems associated with the project that support its operation. A project boundary, once defined, must remain consistent for all subsequent calculations.*
(See glossary for additional details.)

Project teams must submit a detailed statement that defines and clarifies what is deemed a project boundary for their specific project. The statement must include sufficient information to substantiate the boundary as selected.

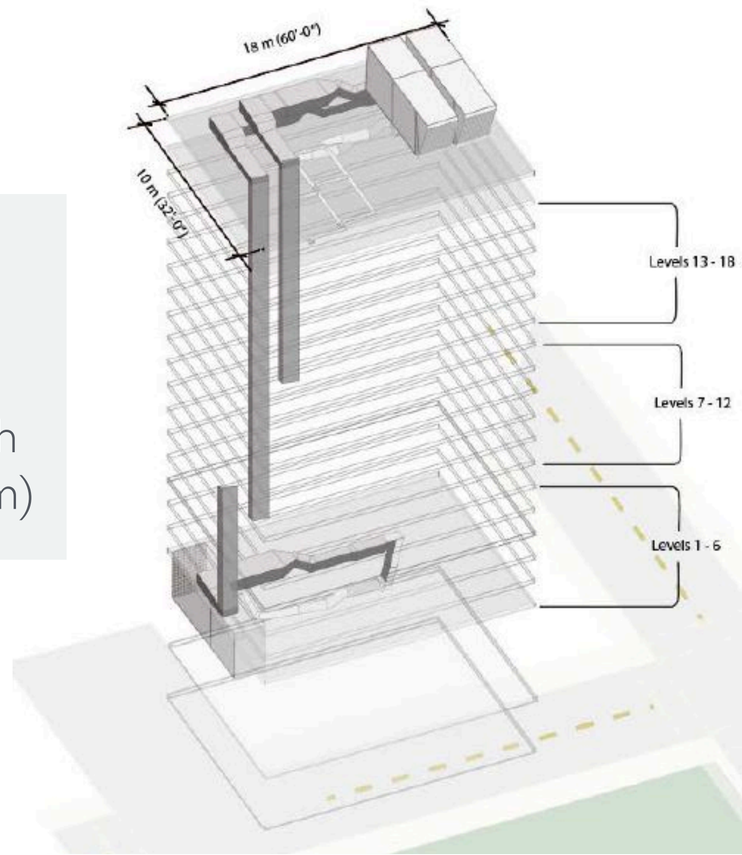
Refer to **RESET™ Air Certification Process for Core & Shell** (Section 2.5) for full documentation requirements.

** Office tower lobbies are exempt from being included in project boundary*

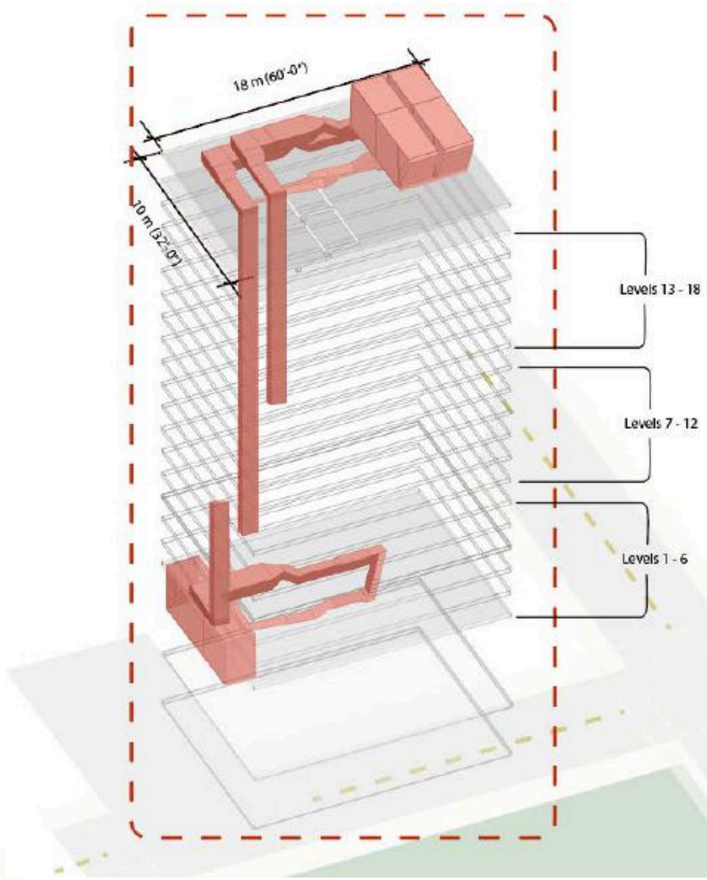
2.4.7.1 Step One
Define Project Boundary

18 Occupied Levels
3 Air intake locations

Each AHU = 17,000 cmh
(10,000 cfm)



■ = Mechanical System



2.4.7.2 Step Two
Deploy Outdoor Monitors

2. Deploy outdoor monitors according to project type using the table below:

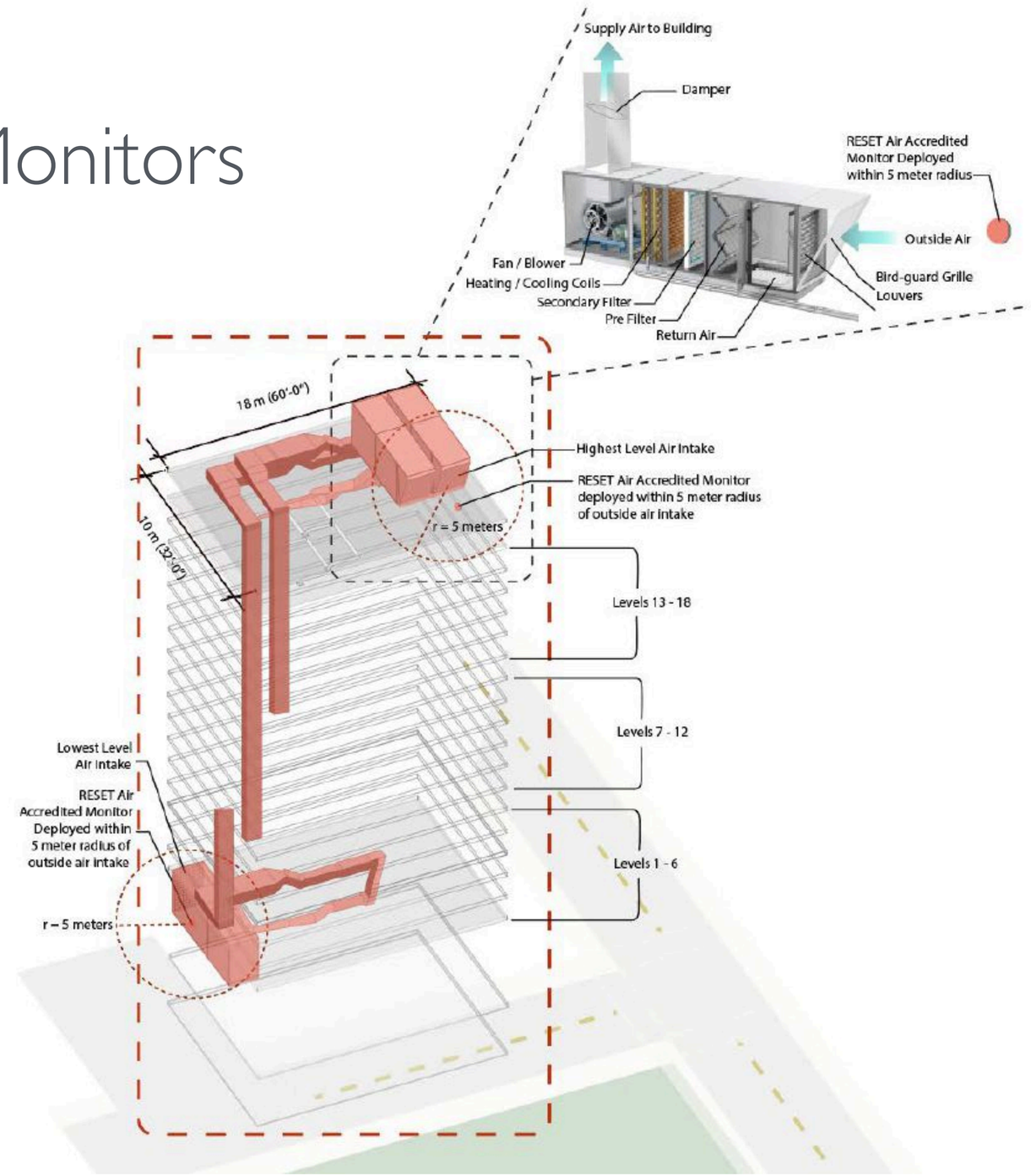
Stories	Number of outdoor air intakes	Number of outdoor monitors required:	Deployment location
≤10	one (1)	one (1)	within 5-meter (16 feet) radius of said outdoor air intake
≤10	> one (1)	one (1)	within 5-meter (16 feet) radius of air intake representative of the poorest outdoor air conditions of the project
≥11	one (1)	one (1)	within 5-meter (16 feet) radius of said outdoor air intake
≥11	> one (1)	one (1)	within 5-meter (16 feet) radius of lowest air intake
		one (1)	within 5-meter (16 feet) radius of highest air intake

* *If intake locations are neither higher nor lower, deploy (1) monitor within a 5-meter (16 feet) radius of the centrally-located air intake.*

2.4.7.2 Step Two
Deploy Outdoor Monitors

In our example, the project is 18 stories and is designed with an HVAC system that has (3) air intakes.

stories	intakes	
≥11	> one	**one (1)** within 5-meter (16 feet) radius of lowest air intake
		one (1) within 5-meter (16 feet) radius of highest air intake



2.4.7.3 Step Three
Calculate Project's Total Air Volume

3. Calculate the project's total air volume based on mechanical system design

Based on the project's mechanical design and equipment specifications, calculate the total air volume that is designed to be delivered to all occupied spaces within the project boundary. * Project teams are advised to consult with their mechanical engineer to ensure correct interpretation of mechanical plans and equipment information.

Teams must submit equipment schedules, mechanical (HVAC) plans and any other helpful documentation necessary to illustrate the mechanical system and how they arrived at their total air volume calculations.

In our example, the project is comprised of 18 floors with occupancy

The mechanical (HVAC) system is designed with 3 AHUs delivering air to 18 occupied floors.

Each AHU is specified to deliver 17,000 cmh (10,000 cfm) to 6-floor blocks

Total Air Volume Calculation:
3 AHUs x 17,000 cmh (10,000 cfm) = **51,000 cmh (30,000 cfm)**

** Office tower lobbies are exempt from this requirement and are not required to be included in the total volume calculation.*

2.4.7.4 Step Four
Calculate 30% of Project's Total Air Volume

4. Calculate 30% of the project's total air volume.

To determine the number of indoor monitors required, calculate 30% of total air volume, rounding up to the nearest whole number if applicable. The calculated result is used to determine quantity of monitors needed to cover the 30% volume of air being delivered to the project's occupied spaces.

Indoor Monitor Calculation: 30% of Total Air Volume	In our example, the mechanical system is designed with:
Total air volume x 30% = Indoor monitor coverage **51,000** cmh x 30% = **15,300 cmh** **(30,000** cfm x 30% = **9,000 cfm)**	AHUs delivering 17,000 cmh (10,000 cfm) per 6-floor block 15,300 cmh (9,000 cfm) is the total that must be covered **Total indoor monitors required = 1**

2.4.7.5 Step Five
Deploy Indoor Monitors

5. Deploy and pair indoor monitors to outdoor monitors

The project team must deploy indoor monitors, co-locating them to outdoor monitor locations. If one (1) indoor monitor is sufficient to meet the 30% requirement, only one monitor is required to be paired with an outdoor monitor location of the team's choosing.

The project team must submit documentation to illustrate and explain deployment locations.

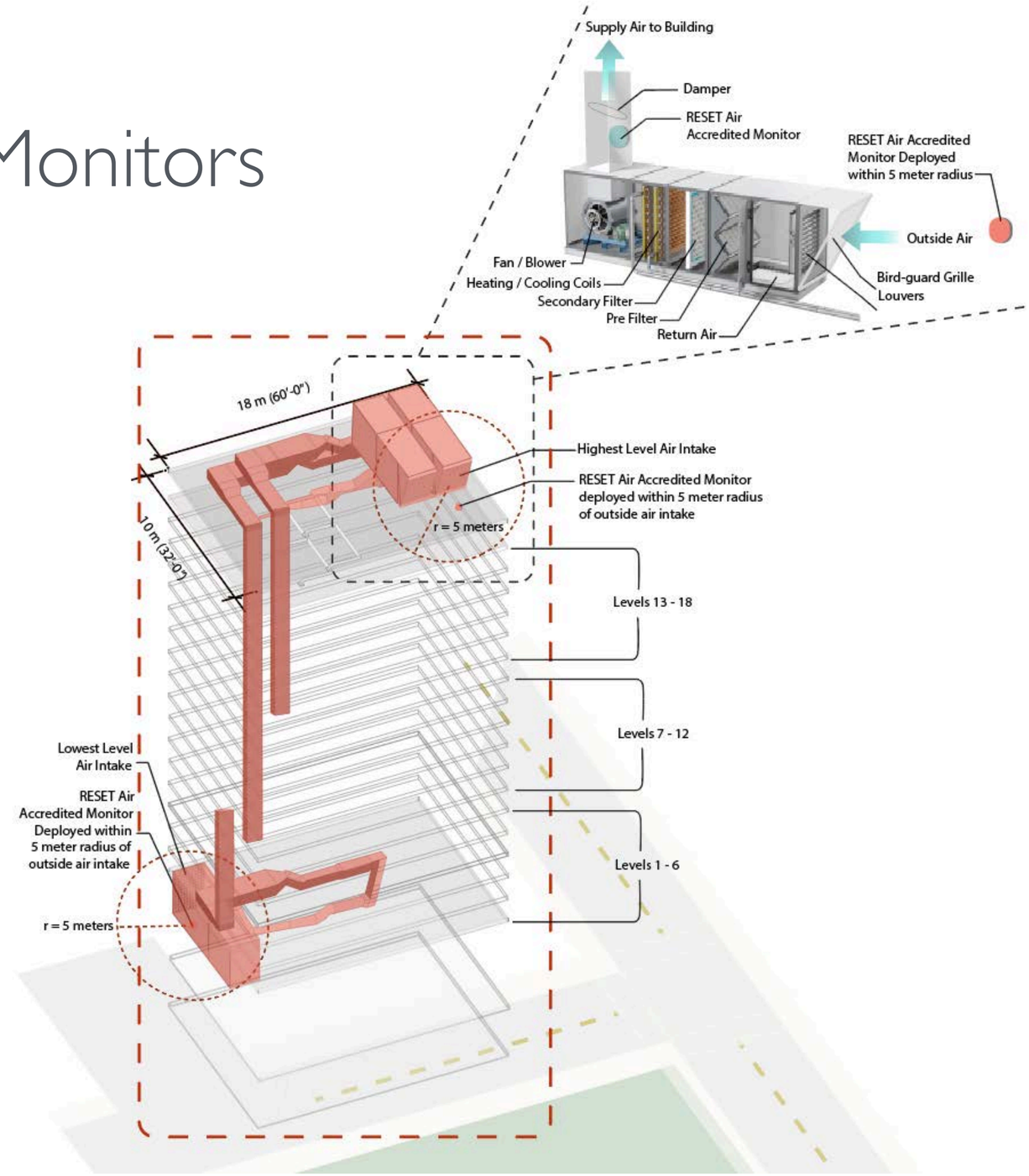
All indoor monitors must be **RESET™ Air Accredited Monitors** (Section 2.6).

Refer to **RESET™ Air Certification Process for Core & Shell** (Section 2.5) for full documentation requirements.

2.4.7.5 Step Five
Deploy Indoor Monitors

In our example, one (1) indoor monitor is needed based on the 30% total air volume calculation.

The indoor monitor is "paired" with a outdoor monitor to satisfy the intent of accruing air quality information for the purposes of data comparison.



2.4.7.6 Step Six
Deploy remaining indoor monitors if applicable

6. Deploy remaining indoor monitors if applicable.

Once all outdoor monitors are paired with an indoor monitor, any remaining indoor monitors must be evenly distributed across the AHUs that deliver the representative 30% air to the project's occupied spaces.

The project team must submit documentation to illustrate and explain deployment locations.

Refer to **RESET™ Air Certification Process for Core & Shell** (Section 2.5) for full documentation requirements.

2.4.8 Glossary

air handling unit (AHU or AH)
A central unit consisting of fan(s), blower, heating and cooling elements, filter racks or chamber, dampers, humidifier, and other central equipment in direct contact with airflow in order to provide ventilation in a building. This does not include the ductwork that goes through the building.

ASHRAE
American Society of Heating, Refrigerating, and Air-Conditioning Engineers www.ashrae.org

constant air volume (CAV)
A type of heating, ventilating, and air-conditioning (HVAC) system where the supply air flow rate is constant, but the supply air temperature is varied to meet the thermal loads of a space.

damper
A plate or gate placed in a duct to control air flow by increasing friction in the duct.

duct or duct work
The housing, conduits or passages used in heating, ventilation and air conditioning (HVAC) systems that serve to contain, deliver and remove air, including supply air, return air, and exhaust air.

2.4.8 Glossary

fresh air intake
An opening through which outside air is drawn into the building, either to replace air in the building that has been exhausted by the ventilation system, or to provide fresh air.

HVAC (heating, ventilation and air conditioning)
The technology of indoor environmental comfort and air quality.

monitor
A device designed to hold individual sensors within it for the purposes of monitoring. A monitor typically consists of an outer housing in order to protect the sensors employed inside. Monitors may also be designed to include electrical ports, wiring and/or cabling for connection to electrical sources, including but not limited to, wifi, ethernet, LED screens, visual display screens and other vendor-specific features. In order to be utilized in a **RESET™ Air Project**, a monitor must be Grade A or Grade B accredited. (Refer to **RESET™ Air Accredited Monitor Standard**)

occupant
Occupants are any individuals, be they employees, visitors, clients, or other users inhabiting a space within the project boundary for more than one hour per day.

2.4.8 Glossary

occupied space
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)

project boundary
The project boundary is not permitted to unnecessarily meaner or exclude portions of the building, HVAC system or interior spaces, that would purposefully and/or unfairly allow the project to achieve any or all of the **RESET™ Air Standard** requirements. Included in the boundary are spaces associated with the project that support its typical operations.

For **RESET™ Air for Core & Shell**, the boundary should include the entire building and associated HVAC system(s). Buildings that are physically connected by programmable space and share any, all or part of an HVAC system, are considered one building and should submit as one **RESET™ Air for Core & Shell** project. Buildings are considered separate and distinct when they function independently, are of different programs and utilize wholly separate HVAC/mechanical/air distribution system(s) and all associated amenities to allow the building to perform its intended function(s.). For example, in a building with two distinct programs supplied by different air systems, such an office tower and retail podium, the office tower may be certified independently of the retail podium and vice versa.

2.4.8 Glossary

regularly occupied space
An area where one or more individuals normally spend time (more than one hour per person per day on average) seated or standing as they work, study, or perform other focused activities inside a building. The one-hour timeframe is continuous and should be based on the time a typical occupant uses the space. For spaces that are not used daily, the one-hour timeframe should be based on the time a typical occupant spends in the space when it is in use. (USGBC LEEDv4)

return or return air
The side of the duct system that draws air from within the building to be exhausted, reconditioned and/or filtered depending on mechanical design.

sensors
Individual technology uniquely developed for the detection of specific air pollutants. A wide variety of sensor technology exists. Some examples include Tapered Element Oscillating Microbalance (TEOM), Beta Attenuation Mass (BAM), Non-dispersive Infrared Gas Detectors (NDIR), Photoionisation Detection (PID) etc.

supply air
The side of the duct system that provides the conditioned or filtered air, depending on mechanical design, back into the building.

2.4.8 Glossary

variable air volume (VAV)
An HVAC system that has a stable supply-air temperature, and varies the air flow rate to meet the temperature requirements. Compared to constant air volume systems, these systems conserve energy through lower fan speeds during times of lower temperature control demand. Most new commercial buildings have VAV systems. VAVs may be bypass type or pressure dependent. Pressure dependent type VAVs save energy while both types help in maintaining temperature of the zone that it feeds.

End of RESET™ Air STANDARD for Core & Shell