



STANDARD

FOR ACCREDITED MONITORS v2.0

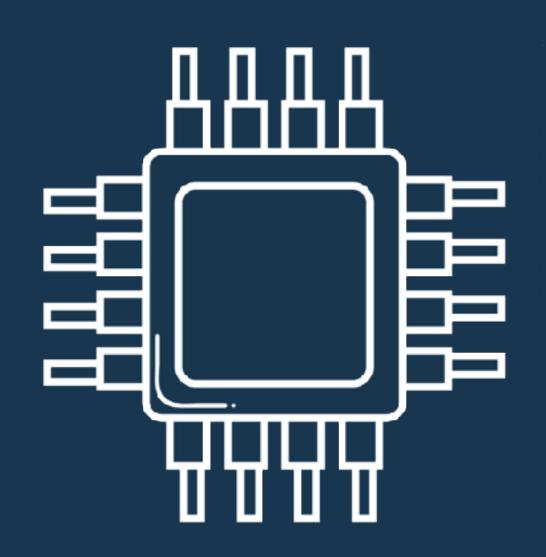


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2.6.0 Preface

A RESET™ Air Accredited Monitor is an air quality monitor that transfers data to recognized and accredited Data Providers for RESET™ Air Certification. The RESET™ Air Standard for Accredited Monitors focuses on the air parameters required by the RESET™ Air for Commercial Interiors and RESET™ Air for Core & Shell building standards. The building standards include five individual air parameters that must be measured in order to be considered for certification. The parameters are: PM_{2.5}, TVOC, CO₂, Temperature, and Humidity.

RESET™ Air **Projects** require the collection of large amounts of data. Data quality and reliability is of critical importance. For the purposes of this document and its associated specifications, data quality is defined as the accuracy of information collected by the sensors over an extended period of time.

The intent of the RESET™ Air Standard for Accredited Monitors is to specify requirements outlining the quality and accuracy of the data to be used for RESET™ Air Projects. The RESET™ Air Building Standards, including RESET™ Air for Commercial Interiors and RESET™ Air for Core & Shell, both require that monitors collect and report air quality data and transfer it to the RESET™ Assessment Cloud for RESET™ Air Projects.

Only RESET™ Air Accredited Monitors are allowed to be used in RESET™ Air Projects.

Details outlining monitor test methodologies and protocols can be found in the RESET™ Air Test Procedure for Accredited Monitors (Section 2.7).

2.6.1 Introduction to Monitor Grades and Types

RESET™ Air Accredited Monitors are defined and categorized by both Grade and Type. Monitor Grade defines the performance, accuracy and data reporting proficiency of a monitoring device. Monitor Type defines the "fit for purpose" scenarios applicable to each Grade and serves to define appropriate deployment of monitoring devices.

The **RESET™** Air Accredited Monitor Grades include:

- Grade A
- Grade B
- Grade C

Grade A: Calibration Grade monitors. Monitors that are used for the calibration of Grade B and C monitors. Grade A monitors are typically (but not exclusively) handheld and are primarily utilized for project commissioning, site audits, and pollutant source detection.

Grade B: Commercial Grade monitors. Grade B monitors provide actionable, indoor air quality data at scale within buildings, balancing performance and cost while reliably enabling building automation and providing occupants with high-quality data.

Grade C: Consumer Grade monitors. Grade C monitors are affordable to the average user or "citizen scientist". Primarily utilized for personal data gathering or non-scientific purposes.

2.6.1 Introduction to Monitor Grades and Types

The **RESET™** Air Accredited Monitor Types include:

- Interior
- In-duct
- Outdoor

Interior monitors are devices that monitor and report air quality within the built environment. Interior monitors are intended to be used for RESET™ Air for Commercial Interiors projects. Interior monitors must comply with the requirements as outlined in the RESET™ Air Standard for Accredited Monitors.

In-duct monitors are devices that monitor and report air quality in a project's mechanical system (ie ductwork/air ducts). In-duct monitors are intended to be used for RESET™ Air for Core & Shell projects. In-duct monitors must comply with the requirements as outlined in the RESET™ Air Standard for Accredited Monitors and must have mechanisms integrated into the design of the device to account for the variable air velocity inherent to mechanical systems.

Outdoor monitors are devices that monitor and report outdoor air quality. Outdoor monitors are intended to be used for RESET™ Air for Core & Shell projects. Outdoor monitors are designed to withstand outdoor weather conditions, including, but not limited to, extreme temperatures and humidity, while maintaining data quality and accuracy. The In-duct monitor and Outdoor monitor performance tests include environmental simulation exercises in order to evaluate a device's performance capabilities.

RESET™ Air Accredited Monitors are designed for continuous monitoring, thus there are basic connectivity and continuous monitoring requirements for all **RESET™ Air Accredited Monitors**.

Only Grade A and B monitors are permitted for use in **RESET™** Air **Projects**.

For **RESET™** Air **Accredited Monitors**, accreditation will be assigned for each of the air parameters individually. An air quality monitor is awarded **RESET™** Air **Accreditation** for a single air quality parameter or for multiple air quality parameters as defined in the **RESET™** Air **Standards**, provided that the monitor fulfills the basic requirements as outlined herein.

All **RESET™** Air Accredited Monitors must fulfill the following Basic Requirements as outlined below:

			Grade A	Grade B	Grade C
а	Interfaces with RESET™ Assessment Cloud		Required	Required	N/A
b	Data Output Interval	min		5	10
С	Data Loss	%		10	N/A
d	Operating Range for Temperature	°C	0 - 50	0 - 40	0 - 40
е	Operating Range for Relative Humidity	%RH	5 - 95 non-condensing	10 - 85 non-condensing	5 - 50 non-condensing
f	Installation Options		Permanent Option	Permanent Option	N/A
g	Calibration Report		Required	Required	Required

a. Interface capabilities with a RESET™ Air Accredited Data Provider

Monitors must demonstrate to RESET™ that they have the ability to interface with a RESET™ Air Accredited

Data Provider (Section 2.8). RESET™ Air Accredited Data Providers refers to certified data providers that are approved for interface with the RESET™ Assessment Cloud.

b. Data Output Interval

The resolution at which readings are recorded and sent from the monitor to the data provider. Both single-point or average values are acceptable.

Grade A monitors must have a data output interval of at least once per minute. Grade B monitors must have a data output interval of at least once every 5 minutes.

c. Data Loss

Data loss occurs when sent data fails to reach its destination. It is a percentage measured by the number of lost readings vs. the number of total readings sent.

Grade A monitors must have a data loss rate no higher than 1%. Grade B monitors must have a data loss rate no higher than 10%.

To prevent data loss in the event of internet connectivity loss or power issues, a built-in data buffer and battery are recommended but not required.

d. Operating Range for Temperature

Monitors seeking **RESET™** Air Accreditation must perform and successfully operate within the proposed range of temperatures.

Grade A monitors must have a minimum operating range of 0-50 °C. Grade B monitors must have a minimum operating range of 0-40 °C.

e. Operating Range for Relative Humidity

Monitors seeking **RESET™** Air Accreditation must perform and successfully operate within the proposed range of relative humidity.

Grade A monitors must have a minimum operating range of 5-95% RH, non-condensing. Grade B monitors must have a minimum operating range of 10-85% RH, non-condensing.

f. Installation Options

Grade A and Grade B monitors must have an option for permanent installation (i.e. fitted into an enclosure) to prevent accidental or intentional disconnection or tampering. A permanent power source is recommended, but not mandatory. A permanent installation option must be demonstrated.

g. Calibration Report

Monitors must be accompanied with documentation from the original manufacturer attesting that the monitor was appropriately calibrated and confirmed functional without defect prior to shipping. Explanation of the methodology for calibration must be provided to **RESET**™.

Particulate Matter 2.5 (PM_{2.5}) is an atmospheric pollutant of fine particles with an aerodynamic diameter of 2.5 μ m or less. Fine particulates are dangerous due to their ability to penetrate deep into the lungs and blood streams.

PM_{2.5} is one of the required air parameters for **RESET™** Air **Projects**.

RESET[™] does not specify PM_{2.5} sensor type, but the sensor technology utilized must be reported.

The default unit for PM_{2.5} is μ g/m³.

The following section specifies PM_{2.5} sensor requirements for **RESET™ Air Accredited Monitors**. For testing procedure, refer to **RESET™ Air Testing Procedure for Accredited Monitors** (Section 2.7).

RESET™ Air Accredited Monitor PM_{2.5} sensor specification requirements, according to Grade, are outlined below:

			Grade A	Grade B	Grade C
а	Sampling Type		Active Airflow	Active Airflow	N/A
Ь	Sensor Output Resolution	µg/m³		I	5
С	Measuring Range	µg/m³	0 - 1000	0 - 500	0 - 300
d	Accuracy	±%	0 - 150 : ±2 && 10% 150 - 300 : ±5 && 15% 300 - 500 : 15% 500 - 1000 : 20%	0 - 150 : ±5 && 15% 150 - 500 : ±5 && 20%	0 - 300 : ±5 && 30%
е	Performance Check and Re-calibration		Required	Required	N/A

a. Sampling Type

The way in which the air is sampled. Active air sampling is a technology utilizing an apparatus or design method to actively draw air into the monitoring device at fixed airflow rates.

Active air sampling is required for RESET Air Accredited monitors.

b. Sensor Output Resolution

The smallest possible measurement at which the sensor can record and output data. The data output from the device must have a resolution of at least the listed value.

Grade A monitors must have a minimum sensor output resolution of at least 1 μ g/m³. Grade B monitors must have a minimum sensor output resolution of at least 1 μ g/m³.

c. Measuring Range

The range at which the sensor is capable of reporting for the given parameter. Monitors must be able to operate within the proposed range of $PM_{2.5}$.

Grade A monitors must have a minimum measuring range of at least 0 - $1000 \, \mu g/m^3$. Grade B monitors must have a minimum measuring range of at least 0 - $500 \, \mu g/m^3$.

d. Accuracy

The proximity of monitor readings as compared to the reference monitor readings per data point.

Grade A monitors must maintain an accuracy of at least:

- $\pm 2 \,\mu g/m^3$ AND $\pm 10\%$ at PM_{2.5} readings between 0 to 150 $\mu g/m^3$.
- $\pm 5 \,\mu g/m^3$ AND $\pm 15\%$ at PM_{2.5} readings between 150 to 300 $\mu g/m^3$.
- 15% at PM_{2.5} readings between 300 to 500 $\mu g/m^3$.
- 20% at PM_{2.5} readings between 500 to 1000 $\mu g/m^3$.

Grade B monitors must maintain an accuracy of at least:

- $\pm 5 \,\mu g/m^3$ AND $\pm 15\%$ at PM_{2.5} readings between 0 to 150 $\mu g/m^3$.
- $\pm 5 \,\mu g/m^3$ AND $\pm 20\%$ at PM_{2.5} readings between 150 to 500 $\mu g/m^3$.

i.e. If a reference monitor is reading 35 μ g/m³, a Grade A monitor's reading must read within 2 + (35 \times 0.1) = \pm 5.5. The Grade A monitor's reading must be between 29.5 and 40.5 μ g/m³ to pass.

e. Performance Check and Re-calibration

An annual performance check of all monitors is compulsory as per RESET™ Air Building Certification.

The PM_{2.5} sensor must demonstrate the ability to be re-calibrated or be removed and exchanged for a new or newly calibrated sensor.

2.6.4 Total Volatiles Organic Compounds (TVOC) Sensor Requirements

Total Volatile Organic Compounds (TVOC) is a general term applied to the overall "total" Volatile Organic Compounds (VOCs) detected within a specified environment. VOCs that contribute to a TVOC reading may represent a wide range of organic chemical compounds. TVOC detection is used to simplify reporting when VOCs are present in ambient air or air emissions. VOCs are numerous, varied, and ubiquitous. An example of a VOC is formaldehyde. Whether or not TVOCs pose a health risk depends on the specific VOCs contributing to the overall TVOC measurement.

TVOC is one of the required air parameters for **RESET™** Air **Projects**.

RESET[™] does not specify TVOC sensor type, but the sensor technology utilized must be reported.

TVOC allows for two units: $\mu g/m^3$ and ppb.The conversion between the two units uses isobutylene's molecular weight of 56.106 g/mol at 25°C and I atm: X ppb = (Y $\mu g/m^3$)(24.45)/(molecular weight). Isobutylene's molecular weight is used is because it is often used for TVOC calibration and it is a good middle ground between formaldehyde (30.03 I g/mol), toluene (92.14 g/mol), benzene (78.1 I g/mol), and ethanol (46.07 g/mol). TVOC is used as a reference and does not serve to replace laboratory testing methodologies for air sampling and/or speciation.

The following section specifies TVOC sensor requirements for **RESET™** Air Accredited Monitors.

2.6.4 Total Volatiles Organic Compounds (TVOC) Sensor Requirements (ug/m³)

RESET™ Air Accredited Monitor TVOC sensor specification requirements in ug/m³, according to Grade, are outlined below:

			Grade A	Grade B	Grade C
a	Sensor Output Resolution	µg/m³		10	100
b	Measuring Range	µg/m³	10 - 5000	150 - 2000	150 - 1000
С	Accuracy	±%	10 - 1000 : ±10 && 10% 1000 - 5000 : ±10 && 15%	150 - 600 : ±20 && 15% 600 - 2000 : ±20 && 20%	150 - 1000 : ±100 && 25%
f	Performance Check and Re-calibration		Required	Required	N/A

2.6.4 Total Volatiles Organic Compounds (TVOC) Sensor Requirements (ppb)

RESET™ Air Accredited Monitor TVOC sensor specification requirements in ppb, according to Grade, are outlined below:

			Grade A	Grade B	Grade C
a	Sensor Output Resolution	ppb	0.44	4.4	44
b	Measuring Range	ppb	4.4 - 2180	65 - 870	65 - 440
С	Accuracy	±%	4.4 - 440 : ±4.4 && 10% 440 - 2180 : ±4.4 && 15%	65 - 260 : ±8.7 && 15% 260 - 870 : ±8.7 && 20%	65 - 440 : ±0.044 && 25%
d	Performance Check and Re-calibration		Required	Required	N/A

2.6.4 Total Volatiles Organic Compounds (TVOC) Sensor Requirements

a. Sensor Output Resolution

The smallest possible measurement at which the sensor can record and output data. Data output resolution is specified below:

Grade A monitors must have a minimum sensor output resolution of at least 1 μ g/m³ (0.44 ppb). Grade B monitors must have a minimum sensor output resolution of at least 10 μ g/m³ (4.4 ppb).

b. Measuring Range

The range at which the sensor is capable of reporting the given parameter. Monitors must be able to operate within the proposed range of TVOC.

Grade A monitors must have a minimum measuring range of at least $10 \,\mu\text{g/m}^3$ - $5000 \,\mu\text{g/m}^3$ (4.4 - $2180 \,\text{ppb}$). Grade B monitors must have a minimum measuring range of at least $150 \,\mu\text{g/m}^3$ - $2000 \,\mu\text{g/m}^3$ (65 - $870 \,\text{ppb}$).

2.6.4 Total Volatiles Organic Compounds (TVOC) Sensor Requirements

c. Accuracy

The proximity of monitor readings as compared to the reference monitor readings per data point.

Grade A monitors must maintain an accuracy of at least:

- $-\pm 10 \,\mu g/m^3$ (4.4 ppb) AND $\pm 10\%$ at TVOC readings between 10 to 1000 $\mu g/m^3$ (4.4 to 440 ppb).
- $-\pm 10 \,\mu g/m^3$ (4.4 ppb) AND $\pm 15\%$ at TVOC readings between 1000 to 5000 $\mu g/m^3$ (440 to 2180 ppb).

Grade B monitors must maintain an accuracy of at least:

- $-\pm 20 \,\mu g/m^3$ (8.8 ppb) AND $\pm 15\%$ at TVOC readings between 150 to 600 $\mu g/m^3$ (65 to 260 ppb).
- $-\pm20~\mu g/m^{3}$ (8.8 ppb) AND $\pm20\%$ at TVOC readings between 600 to 2000 $\mu g/m^{3}$ (260 to 870 ppb).

i.e. If a reference monitor is reading 300 μ g/m³, a Grade B monitor's reading must read within 20 + (300 x 0.15) = ± 65 . The Grade B monitor's reading must be between 235 and 365 μ g/m³.

d. Performance Check and Re-calibration

An annual performance check of all monitors is compulsory as per **RESET™** Air Building Certification.

The TVOC sensor must demonstrate the ability to be re-calibrated or be removed and exchanged for a new or newly calibrated sensor.

Carbon Dioxide (CO_2) is a colorless gas that causes discomfort and affects productivity at high concentrations.

CO₂ is one of the required air parameters for **RESET™** Air **Projects**.

RESET[™] does not specify CO₂ sensor type, but the sensor technology utilized must be reported.

The default unit for CO₂ is ppm.

The following section specifies CO₂ sensor requirements for **RESET™** Air Accredited Monitors.

RESET™ Air Accredited Monitor CO₂ sensor specification requirements, according to Grade, are outlined below:

			Grade A	Grade B	Grade C
a	Sensor Output Resolution	ppm		5	10
b	Measuring Range	ppm	200 - 5000	400 - 5000	400 - 2000
С	Accuracy	± ppm	0 - 2000 : ±40 && 3% 2000 - 5000 : ±50 && 3%	400 - 2000 : ±50 && 3% 2000 - 5000 : ±50 && 5%	400 - 2000 : ±50 && 3% 2000 - 5000 : ±50 && 5%
d	Performance Check and Re-calibration		Required	Required	N/A

a. Sensor Output Resolution

The smallest possible measurement at which the sensor can record and output data. Data output resolution is specified below:

Grade A monitors must have a minimum sensor output resolution of at least 1 ppm. Grade B monitors must have a minimum sensor output resolution of at least 5 ppm.

b. Measuring Range

The range at which the sensor is capable of reporting for the given parameter. Monitors must be able to operate within the proposed range of CO_2 .

Grade A monitors must have a minimum measuring range of at least 200 ppm - 5000 ppm. Grade B monitors must have a minimum measuring range of at least 400 ppm - 5000 ppm.

If a CO₂ sensor cannot fulfill the measuring range requirements, but can fulfill all the other requirements, please contact **RESET™** for special consideration.

c. Accuracy

The proximity of monitor readings as compared to the reference monitor readings per data point.

Grade A monitors must maintain an accuracy of at least:

- ±40 ppm AND ±3% at CO₂ readings between 0 2000 ppm.
- ± 50 ppm AND $\pm 3\%$ at CO₂ readings between 2000 5000 ppm.

Grade B monitors must maintain an accuracy of at least:

- ± 50 ppm AND $\pm 3\%$ at CO₂ readings between 400 2000 ppm.
- ±50 ppm AND ±5% at CO₂ readings between 2000 5000 ppm.

i.e. If a reference monitor is reading 900 ppm, a Grade B monitor's reading must read within $50 + (0.03 \times 900) = \pm 77$. The Grade B monitor's reading must be between 823 and 977 ppm.

d. Performance Check and Re-calibration

An annual performance check of all monitors is compulsory as per RESET™ Air Building Certification.

The CO_2 sensor must demonstrate the ability to be re-calibrated or be removed and exchanged for a new or newly calibrated sensor.

Temperature refers to the average temperature of the air surrounding a building occupant, with respect to location and time. Temperature in the context of RESET Air, is not be confused with thermal comfort.

Temperature is one of the required air parameters for RESET™ Air Projects.

RESET[™] does not specify temperature sensor type, but the sensor technology utilized must be reported.

The default unit for temperature can be either °C or °F as the default unit for temperature because an exact conversion factor between the two is available.

The following section specifies temperature sensor requirements for RESET™ Air Accredited Monitors.

RESET™ Air Accredited Monitor temperature sensor specification requirements, according to Grade, are outlined below:

			Grade A	Grade B	Grade C
a	Sensor Output Resolution	°C	0.1	0.1	
b	Measuring Range	°C	0 - 50	0 - 40	0 - 40
С	Accuracy	± °C	0.5		2
d	Performance Check and Re-calibration		Required	Required	N/A

a. Sensor Output Resolution

The smallest possible measurement at which the sensor can record and output data. Data output resolution is specified below:

Grade A and Grade B monitors must have a minimum sensor output resolution of at least 0.1 °C.

b. Measuring Range

The range at which the sensor is capable of reporting for the given parameter. Monitors must be able to operate within the proposed range of temperature.

Grade A monitors must have a minimum measuring range of at least 0 °C - 50 °C. Grade B monitors must have a minimum measuring range of at least 0 °C - 40 °C.

The measuring range is separate from "Operating Range for Temperature" in **Basic Requirements** (Section 2.6.2).

c. Accuracy

The proximity of monitor readings as compared to the reference monitor readings per data point.

Grade A monitors must maintain an accuracy of at least ± 0.5 °C. Grade B monitors must maintain an accuracy of at least ± 1 °C.

d. Performance Check and Re-calibration

An annual performance check of all monitors is compulsory as per **RESET™** Air Building Certification.

The temperature sensor must demonstrate the ability to be re-calibrated or be removed and exchanged for a new or newly calibrated sensor.

Relative Humidity is the ratio of the amount of water vapor in the air to the amount of water vapor that the air could hold at the specific temperature and pressure.

Relative Humidity is one of the required air parameters for **RESET™** Air **Projects**.

RESET[™] does not specify humidity sensor type, but the sensor technology utilized must be reported.

The default unit for humidity is % RH (relative humidity).

The following section specifies humidity sensor requirements for RESET™ Air Accredited Monitors.

RESET™ Air Accredited Monitor humidity sensor specification requirements, according to Grade, are outlined below:

			Grade A	Grade B	Grade C
a	Sensor Output Resolution	% RH	0.1		
Ь	Measuring Range	% RH	5 - 95	10 - 80	20 - 80
С	Accuracy	± % RH	3	8	ΙΟ
d	Performance Check and Re-calibration		Required	Required	N/A

a. Sensor Output Resolution

The smallest possible measurement at which the sensor can record and output data. Data output resolution is specified below:

Grade A monitors must have a minimum sensor output resolution of at least 0.1% RH. Grade B monitors must have a minimum sensor output resolution of at least 1% RH.

b. Measuring Range

The range at which the sensor is capable of reporting for the given parameter. Monitors must be able to operate within the proposed range of humidity.

Grade A monitors must have a minimum measuring range of at least 5% RH - 95% RH. Grade B monitors must have a minimum measuring range of at least 10% RH - 80% RH.

The measuring range is separate from "Operating Range for Relative Humidity" in **Basic Requirements** (Section 2.6.2).

c. Accuracy

The proximity of monitor readings as compared to the reference monitor readings per data point.

Grade A monitors must maintain an accuracy of at least $\pm 3\%$ RH. Grade B monitors must maintain an accuracy of at least $\pm 8\%$ RH.

d. Performance Check and Re-calibration

An annual performance check of all monitors is compulsory as per RESET™ Air Building Certification.

The humidity sensor must demonstrate the ability to be re-calibrated or be removed and exchanged for a new or newly calibrated sensor.

2.6.8 RESET™ Air Accredited Monitor Certification

RESET™ Air Accredited Monitor certification protocol is as follows:

- Request to become a RESET™ Air Accredited Monitor
 Contact RESET™ at info@reset.build.
- 2. Submit Documentation

The monitor manufacturer must submit all required documentation to **RESET**™, including a monitor specification sheet.

- 3. Testing Setup and Process
 Refer to RESET™ Air Test Procedure for Accredited Monitors (Section 2.7) for test procedure.
- Certified RESET™ Air Accredited Monitor
 RESET™ Air Accredited Monitors will be showcased on the RESET.build website, inclusive of accreditation details, contact information, and links.

2.6.8 RESET™ Air Accredited Monitor Certification

5. Future Monitor Audits

A representative number of monitors of at least 5 monitors will be subject to annual testing for quality assurance and quality control purposes.

Accreditation applies only to the specific monitor model submitted to **RESET**[™] for accreditation. Any modifications to the monitor, sensors, and/or any technology employed within the monitor will nullify its **RESET**[™] **Air Accredited Monitor** status. Monitors altered or modified are subject to recertification requirements.

6. Conditions for Loss of Accreditation Status

Failed audits will result in loss of accreditation status. Monitors that are not **RESET™** Air Accredited Monitors cannot be used for future **RESET™** Air **Projects** until accreditation is regained.

End of RESET™ Air STANDARD

For Accredited Monitors

