Monitoring Technology Compatibility Assessment

Sensirion

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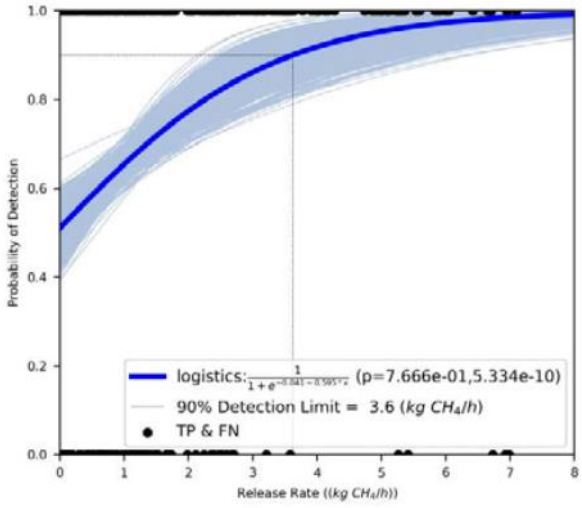
Purpose

The MiQ Foundation, as the Standard holder, has developed this monitoring technology compatibility assessment to streamline market research conducted by Operators and other stakeholders to assess the compatibility of methane monitoring technologies against the requirements in the Monitoring Technology Deployment pillar of the MiQ Standard.

This document does not endorse or reflect the personal views of the MiQ Foundation and is not intended to be exhaustive. The sole aim of this document is to provide stakeholders with an impartial summary mapping the characteristics of methane monitoring technologies and methods to MiQ requirements. This document does not guarantee that a monitoring technology or method will be compliant for a specific deployment of that technology or method. MiQ Auditors may reference the information in this document while conducting MiQ Audits, but still must assess each deployment individually. MiQ encourages Operators to carry out additional independent assessments of technologies and methods for their specific deployments.

MiQ has conducted the following assessment based on best available data, vendor-provided documentation, and published studies at the time of preparation. MiQ reserves the right to make updates to the documentation on a periodic basis to conform with new MiQ Standard updates and updated vendor documentation.

MiQ is not liable for any information provided or technology capabilities guaranteed by the technology provider.

CRITERIA	STANDARD REFERENCE	DESCRIPTION
GENERAL INFORMATION		
Name		Sensirion Connected Solutions
MiQ Application	Section 3.2.1	Facility Scale and Source Level Inspections
Deployment Method	Section 4.1 – *Table 3 Detection Technology Specification (Bullet 2)*	Continuous Monitoring Systems (CMS) – Laser Spectroscopy
Sensor	Section 4.1 – *Table 3 Detection Technology Specification (Bullet 1)*	Sensirion's Nubo Sphere sensors utilize proprietary, laser spectroscopy technology in conjunction with environmental sensors (e.g. ultrasonic 2D anemometers) and atmospheric inversion modelling to detect, locate and quantify emissions.
PERFORMANCE SPECIFICATIONS		
Emission Source Coverage	Section 3.2.1- *Item 1*	Nubo Sphere measures emissions as low as 0.01 kg/h from elevated sources and underground sources (buried pipelines) once methane reaches the atmosphere.
Measurement Frequency	Section 3.2.1- *Item 1*	Continuous. Nubo Sphere sensors take measurements every 5 second and transmits the data every 15 minutes to a cloud-based analytics system and a smartphone friendly web interface.
Attribution Level	Section 3.2.1- *Item 4*	Equipment group level
Published Test Protocol	Section 4.1 – *Table 3 Detection Technology Specification (Bullet 4)*	ADED 2023 @ METEC Testing: CEM under single-blind testing
MDL @ 90% PoD (Min MiQ MDL requirement is 25kg/hr)	Section 3.2.1- *Item 3*	3.6 kg/hr. Under ideal wind conditions sensors can achieve 0.8kg/h (90% PoD) detection sensitivity (see Reference document #1 for Sensirion's analysis). See Equivalency Determination below for additional detail.
PoD Curve	Section 3.2.1- *Item 3*	 **Figure 1**. Sensirion PoD Curve METEC, ADED 2023

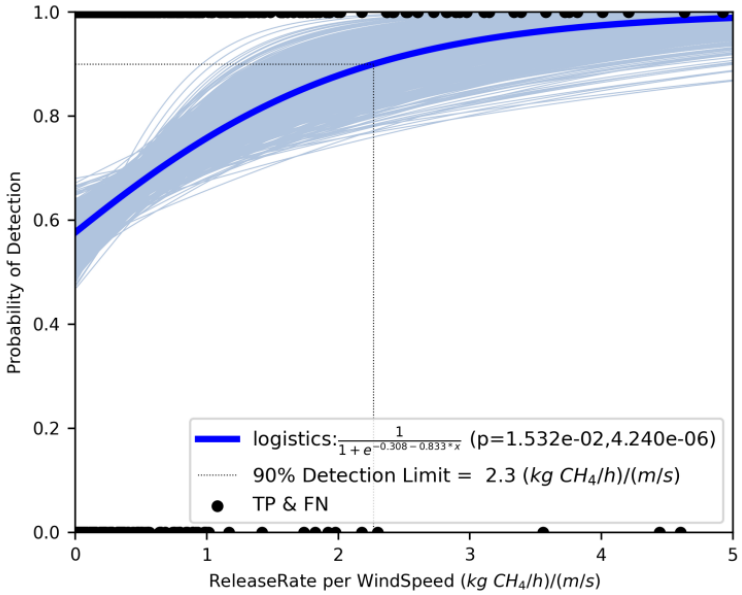


Figure 2. Sensirion wind influenced PoD Curve METEC, ADED 2023

TECHNOLOGY LIMITATIONS		
Operational Limitations	Section 4.1 – *Table 3 Detection Technology Specification (Bullet 3)*	Eligible *monitoring areas* are limited to a 100 m radius of each device with quantification error bands of +/- 20%. Accuracy of ambient methane concentration measurements: +/- 0.5 ppm +/- 2.5% of measured value.
Environmental Limitations	Section 4.1 – *Table 3 Detection Technology Specification (Bullet 3)*	Presence of very low (<1 m/s) and very high winds (>15 m/s), along with temperatures outside of -20 to +50 deg C range influence the detection sensitivity or availability of Nubo Sphere sensors.
EQUIVALENCY DETERMINATION		
Applicability	Section 3.2.3	An Operator using CMS over a subset of Sites (<100%) can implement a monitoring strategy for Source Level and/or Facility Scale inspections utilizing the Nubo Sphere technology that differs from the pre-defined strategies in Table 2 of the MTD Subsidiary Document 3 of the MiQ Standard. Please refer to the MiQ Equivalency Table for additional information or contact MiQ.
RECONCILIATION CONDISERATIONS		
Reconciliation	MI Section 3.3 - *Item 4*	Nubo Sphere sensors can attribute emissions at the equipment group or equipment unit level. They are typically deployed as a network of 4-12 fixed devices depending on the complexity and topology of the site and the customers performance targets at approximately 20 m - 60 m (66 ft to 197 ft) downwind of potential emission sources. A Producer/Operator utilizing the sensors may need to follow up with a ground inspection to attribute emissions accurately to an individual source if the emissions timeseries and SCADA are unable to confirm the source via a desktop study. This technology quantifies emission rate using a proprietary algorithm (based on plume inversion modeling) which takes into consideration plume behaviours, sensor measurements and environmental measurements. Due to the nature of continuous monitoring technologies, Operators can set alerting thresholds and get real time data of detected events via email, SCADA and/or dashboard. This data allows Operators to infer emission duration and emission source.

	Causal Examination using operational and maintenance data may be required to understand the cause and origin of a detected event.

ADDITIONAL DOCUMENTS	
Sensirion News and Resources	Sensirion Nubosphere Technical Docs Sensirion Newsroom
2023 ADED Performance Results	2023 ADED Results (Sensirion Whitepaper)

Document Status

Table: Version History

Version	Date	Summary of Change
1.0	2024-03	First Publication