aethair PRO for
Diesel Particulate Matter Detection

Aethair Pro offers real-time monitoring for Diesel Particulate Matter Detection (DPM) detection with configurable sensors, providing critical air quality insights across various applications.

What is Diesel Particulate Matter (DPM)?

DPM is an ultrafine byproduct of diesel combustion, composed of solid particles and aerosols under 1 micron. These particles react with nitric oxide (NO) and oxygen (O_2) in the atmosphere, forming nitrogen dioxide (NO_2)– collectively known as NOx ($NO + NO_2$).

For accurate NOx detection, using both NO and NO_2 sensors in the ppb range are recommended. Aethair Pro is best configured with Alphasense NO and NO_2 sensors but can also estimate NOx using a single sensor, allowing additional space for detecting other hazardous gases.

Estimating NOx Without Dual Sensors

Environment	NOx Estimation Formula	Typical NO / NO2 Ratio
Urban Traffic (Smart Cities)	$NOx \approx NO_2 \times 5$	75–85% NO, 15–25% NO_2
Confined Spaces (Garages, Tunnels, Fire Stations)	$NOx \approx NO_2 \times 2$	50/50 Ratio

Applications for DPM Monitoring

Application	Key Monitoring Areas
Fire & EMS	Apparatus bays, fire truck driver exposure to exhaust and on-scene smoke
Mining Industry	Underground mining safety, MSHA compliance
Construction Sites	Heavy equipment emissions, ventilation improvement
Transportation & Logistics	Railways, truck depots
Ports & Maritime Industry	Ship emissions, container handling
Tunnels & Underground Infrastructure	Roadway tunnels, subway maintenance
Warehouses & Distribution Centers	Diesel forklifts, ventilation optimization
Airports	Ground support equipment, worker safety
Environmental & Regulatory Compliance	EPA regulations, urban air quality monitoring
Healthcare & Research	Occupational health studies, air quality research

Health Risks of DPM Exposure

Due to their tiny size, DPM particles penetrate deep into the respiratory tract, reaching the alveoli in the lungs and even entering the bloodstream, causing severe health effects like respiratory diseases, cardiovascular issues, and cancer.

Below is a ranking of key gases associated with DPM, helping sales teams guide discussions with customers regarding air quality concerns and recommended detection thresholds.

Rank	Gas	Source	Moderate Concern	High Concern	Comments
1	PM1	Soot & ultrafine particles	15 - 50 µg/m³	> 50 µg/m³	Strong indicator of diesel emissions
2	NO_2	Secondary reaction from NO	20 - 100 ppb	> 100 ppb	Correlates with PM levels
3	NO	Fresh diesel exhaust	50 - 200 ppb	> 200 ppb	High levels indicate fresh diesel exhaust
4	CO	Incomplete combustion	1 - 10 ppm	> 10 ppm	Suggests inefficient combustion
5	CO_2	Diesel combustion marker	800 - 1000 ppm	> 1000 ppm	High indoor levels indicate diesel operation
6	SO_2	High-sulfur diesel	1 - 5 ppb	> 5 ppb	Suggests high-sulfur fuel usage
7	VOCs (BTEX, HC)	Diesel fuel vapors	50 - 100 ppb	> 100 ppb	Detected near fuel leaks or exhaust fumes

Official Exposure Limits for DPM and Related Pollutants

Pollutant	Agency	Exposure Limit
DPM (Elemental Carbon)	MSHA	160 µg/m³ (underground mining)
NO_2 (Nitrogen Dioxide)	OSHA	5 ppm (15-min STEL)
NO_2 (Nitrogen Dioxide)	NIOSH	1 ppm (8-hour TWA)
NO (Nitric Oxide)	OSHA	25 ppm (8-hour TWA)
CO (Carbon Monoxide)	OSHA	50 ppm (8-hour TWA)
CO (Carbon Monoxide)	NIOSH	35 ppm (8-hour TWA), 200 ppm (ceiling)
PM1 (Fine Particulate Matter)	EPA	Regulated under PM2.5 (35µg/m³, 24-hour avg)
SO_2 (Sulfur Dioxide)	OSHA	5 ppm (8-hour TWA)
VOCs (BTEX - Benzene, Toluene, Ethylbenzene, Xylenes)	OSHA (Benzene)	1 ppm (8-hour TWA), 5 ppm (STEL)

Conclusion

The Aethair Pro delivers real-time DPM monitoring with adaptable sensor configurations for diverse applications. Understanding key pollutants and exposure limits enables effective air quality management and regulatory compliance.

How can we help you?

If you would like to find out more about how we can help you, please give us a call or send us an email.

Contact Us: +1 (267) 225-8487   sales@aethair.io

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See The Air You Breathe

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