

GUIDELINES FOR SENSOR LOCATIONS

Critical Environment Technologies Canada Inc.



Where a gas detector should be mounted within a space is dependent on many variables. There are no specific formulas. A general rule to follow is:

- Heavier than air gases should be detected 6 in / 15 cm from the floor
- Lighter than air gas sensors should be placed on or near the ceiling
- Gases which have a density close to that of air should have sensors installed in the 'breathing zone'

The breathing zone refers to the area 4 to 6 ft / 1.2 to 1.8 m from the floor, where most human breathing takes place. This is a good default location for sensors, as many gases are often well dispersed in air. However, each application will have its own determining factors and priorities. These include, but are not limited to:

Source of Gas

Is the source a combustion exhaust from a vehicle or furnace or a vapour from a tank spill, pipe leak, or faulty valve? Sensors should be placed near the source of the gas if possible, for example near the compressor or piping that could leak.

Density of Gas

Some gases are lighter than air and will rise to the ceiling, others are heavier and will migrate towards the floor or into a pit or low lying area.

Use of the Area

Is the area frequented by people working or congregating or is it a room that is rarely entered like a storage room or chiller room? More frequented places tend to require additional features and functionality to comply with occupational health standards.

Layout of Area

Alcoves, barricades, pits, unusual shapes, etc. may indicate that additional sensors need to be used to ensure full coverage of the area.

Normality of the Gas

Is this a gas that is typical of the area and should be exhausted only if it increases to unsafe levels or is the gas not normally present and should be alarmed of immediately when sensed?

Regulatory Authorities

Are there any local regulations that must be adhered to regarding the placement of the sensor?

Exhaust Equipment and Vents

Is there an air flow pattern in the room? Sensors should not be placed near ventilation fans or openings to outside. They should be placed in areas where there is good air circulation, but not in the path of rapidly moving air. Pay particular attention to 'dead air spots' where there is little or no air movement.

Service and Safety Access

Consideration should be given to the ease and safety of accessibility for maintenance, testing and calibration.

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TYPICAL LOCATIONS FOR SPECIFIC GASES

Carbon Monoxide (CO)

Most enclosed parking garages have a concentration of CO in the air at various times throughout the day, especially when vehicles are started and idling. The purpose of the gas detection system is to keep the CO concentration at safe levels for the public by adequately ventilating the vehicle exhaust.

CO is about the same density as air and will readily disperse throughout an area where there may be air movement and activity. Mounting CO gas detectors in the breathing zone (4 to 6 ft / 1.2 to 1.8 m) from the floor will provide the safest detection for people in the parking garage. Some local regulations may dictate lower or higher placement. Lower placement may result in damage from equipment, vehicles, and direct blasts from vehicle exhaust. Higher placement runs the risk of the sensor not detecting the concentration of gas at the height that people are breathing as they walk to and from their cars.

If the garage has an open area layout, one sensor provides coverage of up to a 50 ft / 17 m radius with 360 degree Coverage. L" shaped garages or garages with alcoves and multiple walls may require additional sensors. If there are pits in the area, individual sensors should be mounted in each pit.

Nitrogen Dioxide (NO₂)

During the combustion process of diesel engines, oxygen and nitrogen combine together to form NO₂. Since the exhaust is initially hot, it will rise upwards. As it cools NO₂ is formed and because it is heavier than air, it falls down through the breathing zone towards the floor. Air movement and activity can prolong its time in the breathing zone. Mounting NO₂ gas detectors in the breathing zone (4 to 6 ft / 1.2 to 1.8 m) from the floor will provide the best coverage for monitoring. If there are pits in the area, individual sensors should be mounted in each pit.

Ammonia (NH₃)

Found in places such as arenas, chiller rooms, and food and drink packaging plants, ammonia is normally not present in the air unless a tank, valve, or pipe leak has occurred. Ammonia is lighter than air and will rise toward the ceiling. Mounting the sensor on a wall or pillar near or on the ceiling is recommended to ensure the gas passes over the sensor. For quick alarm response, the sensor should be mounted over the likely source of a leak, such as the storage tank or valves/regulators.

Methane (CH₄)

Methane gas is typically a by-product from sewage, wastewater and landfills or commercially used for combustion in heating and cooking appliances (natural gas). It is lighter than air and will migrate towards the ceiling. As it concentrates along the ceiling and into ceiling pockets, the levels can become explosive. A gas detector should be mounted near or on the ceiling close to where the gas can become trapped. It should be accessible for regular testing and calibration by a service technician by means of a ladder.

Propane (C₃H₈)

Propane is not normally present unless a tank leak has occurred. Propane is heavier than air and will pool towards the floor where the concentration can rise to combustible levels. Locate the sensor close to the source. Sensors should be mounted on the wall or pillar about 12 to 18 in / 30 to 45 cm above grade to keep clear of floor cleaning equipment. If there are pits in the area, individual sensors should be mounted in each pit.

Refrigerants (R11, R22, R123, R134A, etc.)

Most refrigerants are heavier than air and will migrate toward to the floor. Refrigerant gas is not normal in a room and any presence will usually indicate a tank, pipe, or valve leak. Sensors should be mounted about 12 to 18 in / 30 to 45 cm above the finished floor, near the source.