Air Monitoring

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Background

Fire apparatus are often equipped with air monitoring instruments to enhance firefighter safety. Ensuring detectors are accurate is paramount in ensuring the instrument alarms at the specified alarm set point.

The most common types of air monitoring found on fire apparatus are the single-sensor gas monitor, usually equipped to monitor for Carbon Monoxide (CO) or Hydrogen Cyanide (HCN), or the multi-gas detector, designed to monitor for Oxygen (O_2), Carbon Monoxide (CO), Hydrogen Sulfide (H_2S) and Lower Explosive Limits (LEL).

Concerns/hazards

Poorly maintained air monitoring devices can produce inaccurate readings, which may lead to potential exposure to dangerous atmospheres or poorly informed decision making at the incident scene. Also, gas monitors do not provide results instantly - this is called “lag time.”

Actions for employers

Employers must:

- ensure equipment is maintained in good condition as per manufacturer’s recommendations

- provide information and instruction to workers on the use of air monitoring equipment and the interpretation of instrument readings

Employers should:

- maintain training records for each firefighter in the use of the air monitoring instrument
- provide equipment and supplies to calibrate and bump test (daily accuracy test) an instrument as required
- bump test any air monitoring instrument on a daily basis or before each use to ensure sensors are accurately detecting gases and concentrations
- calibrate air monitoring instruments at a maximum of 30-day intervals or after exposure to significant concentrations of gas to prevent “sensor drift”
- maintain records of instrument test results
- have a maintenance and replacement program for sensors and instruments
- follow the manufacturer’s recommendations for inspection station placement, testing, maintenance, and use

Considerations

Fire fighters should be trained in the proper methods of monitoring for gases in the atmosphere. Here are some considerations for monitoring procedures:

- take readings for at least 20 seconds and up to 2 minutes within a certain area to reduce the potential of false readings
- the use of gas tubing for sampling will typically add an additional 2 seconds per foot of tubing used
- vapor density and air current within the space being monitored will have an impact on accuracy of readings, so consider the 20/20/20 rule: take samples at 20 second intervals at the knee, waist and over the head levels

Consider this additional information about the use and limitations of air monitoring equipment:

- air quality may be affected by other gases which are not detected by the device
- corrosive gases such as chlorine or ammonia may harm the device – check the manufacturer’s instructions for use in these environments
- ensure bump gas is the proper mixture for the instrument and its sensors

- provide air monitoring at the rehabilitation area of any incident
- refer to the confined space rescue guidance note for additional considerations for air monitoring
- refer to the hybrid/electric and electrical vehicle safety guidance note for further information, as applicable

Applicable regulations and acts

Read:

- *Occupational Health and Safety Act*
    - clause 25(2)(a) for providing information and instruction to a worker
    - clause 25(2)(h) for taking every precaution reasonable in the circumstances to protect workers

Relevant standards

Read CSA C22.2 No. 152-M1984 (R2016) Combustible Air monitoring Instruments, which covers the details of construction, performance, and test for portable and stationary electrical instruments for sensing the presence of combustible gas or vapour concentrations in air.

Read CSA Z1006-16 Management of work in confined spaces, for health and safety management of work in confined spaces.

Read NFPA 1584, Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises for information on air monitoring during rehabilitation during emergency operations and training exercises.

Read NFPA 1072, Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications for information on air monitoring during hazardous materials response.

Related

Read firefighter guidance notes:

- 6-5 Confined space rescue
- 6-12 Rehabilitation during emergency operations
- 6-19 Hybrid/electric and electrical vehicle safety
- 6-31 Agricultural silos
- 6-38 Carbon dioxide hazards
- 6-39 Hydrogen sulphide chemical suicides