

Master Brewers Safety Toolbox Talk



Fixed Gas Detection Systems

Overview

All breweries use and produce carbon dioxide, CO₂. This invisible gas is very useful to the brewing industry but can also be very deadly. It is very important that breweries have methods to quickly identify when the amount of CO₂ present reaches a dangerous level. In a previous TBT we discussed CO₂, here we will assist with understanding fixed gas detection systems. ([CO₂ Toolbox Talk](#))

A little CO₂ refresher

Carbon dioxide has a specific gravity of 1.5, meaning it is 1.5 times heavier than air and will sink or seek low-lying (basements, drains, sumps, bottom of fermenters, tanks, etc.). As it collects in these low-lying areas, it will displace breathing air and become more concentrated.

What is a Fixed Detection System?

Fixed gas detectors are generally installed and used to both detect leaks and act as an early warning system of gas leaks from a specific system. Some Fixed systems also have relays and customizable alarm point settings. These alarms ensure quick response to atmospheric hazards by activating relays. Relays are wired to other electrical equipment that provide crucial lifesaving functions, and These include opening/closing ventilation, starting exhaust fans, triggering auditory and visual alarms, and closing electronic valves.

The Pros and Cons of Fixed Systems

Pros:

- Fixed gas detectors provide automatic responses.
- They can be set to shut down a system once a leak reaches a specified alarm level.
- They monitor flammable and toxic gas levels to keep your personnel safe.
- Fixed gas detectors can be used in tandem with area detectors to sense dangerous leaks and alarm at specific set points.

Cons:

- Fixed gas detectors are more expensive than portable detectors.
- They only detect gas that diffuses into it, meaning it cannot completely cover the leak potential in multiple areas.
- Due to their limited coverage ability, placement of sensors is extremely important to make them effective.
- They're impractical for areas that may be cramped or difficult to reach.
- Unlike portable detectors, fixed detectors require a constant power supply.

Considerations for Fixed Systems

Every fixed gas detection system is different. A site survey by a qualified installation engineer is highly recommended as there must be consideration for the following:

Gas Hazard Behavior

- The gas hazard must be assessed, and the system specified appropriately. All gases have different molecular weights and will behave in different ways.

Location

- The location in which you are monitoring should be assessed based on environmental conditions such as temperature, humidity, wind or air flow. For example, if there is a known, consistent, direction of air flow then the gas detector must be positioned "down wind" of the potential leak source.

Alarms

- This is where you determine what the fixed gas detection system should tell you. If monitoring for oxygen depletion, the alarm should actuate at either the onset of a gas leak or when O₂ levels begin depleting. As a result, a sound or beacon alarm will provide a "SAFE – NOT SAFE" indication controlled by the relay output of the controller.

- In cases where you are monitoring toxic gases with average exposure limits STEL (Short-term exposure limit over 15 mins) or TWA (Time weighted average exposure limit over an 8-hour period), it is best to program the system to actuate alarms at pre-determined thresholds.

Control Relay and Closed Loop

- If they have process control capability, you can use fixed gas detection systems to monitor and control an environment. The control panel outputs can activate emergency CO₂ extraction, for example, to ventilate a space and reduce the unwanted gases. In some cases, fixed gas detection systems shut down processes as a safety precaution to allow for corrective maintenance.

Final Thoughts

A Gas Detection System is a critical component of personnel safety in a brewing environment. Companies should evaluate their facility to determine applicability of fixed gas detectors. At a minimum, portable gas detection should be used in environments where CO₂ and other gases could be present.

Look at future Toolbox Talks for more information regarding topics to cover, training ideas and more.

If you have any questions regarding this, please see your supervisor/manager or a member of the Safety Committee.

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<http://www.mbaa.com/brewresources/brewsafety>