Understanding and Using LEL Gas Monitors on a Construction Site

By Rick Pedley | Sunday, October 31, 2021

Measuring the lower explosive limits of combustible gases is essential in the construction industry. A gas leak can occur at any time, endangering the lives of workers and clients. If these gases reach a certain threshold, the gas could combust, leading to a ash re or explosion. Construction managers and business leaders need to understand how LEL gas monitors function in the workplace to keep their workers safe.

WHAT IS THE LEL OF A GAS?

LEL stands for the lower explosive limit of a combustible gas or vapor. This may include methane, carbon monoxide and other ammable gases. The LEL is displayed based on how much of the target gas is in the air, which is usually measured as % Vol or parts per million.

Every type of ammable gas will combust once it reaches a certain % Vol. For example, methane will combust when in the presence of an ignition source when it reaches 5% Vol or 5,000 ppm, which means approximately 5% of the air is made of methane. Carbon monoxide will combust when it reaches 12.5% Vol. or 22,000 ppm. This means that methane comes with an LEL of 5% and CO comes with an LEL of 12.5%.

HOW TO MEASURE THE LEL OF A GAS

Every construction site should use an LEL gas monitor when working with or near combustible gases. The monitor displays the LEL as a percentage. This shows the user how close they are to the combustion threshold.

For example, when the amount of methane has reached 2.5% Vol, the monitor will record 50% LEL. This shows the user that they are halfway to reaching the LEL. If volume continues to rise to 5.0% Vol, the gas monitor will display 100% LEL. This means the gas has reached the lower explosive limit and the air could ignite at any moment. Construction sites tend to be particularly vulnerable to ash res and explosions. Many types of equipment in the workplace rely on heat and ignition.

Some individuals have trouble di erentiating between % Vol and the % LEL. An easy way to discern %Vol and %LEL is that the former is essentially a measurement of "how much in air" and the latter is an assessment of “how dangerous."

HOW DO LEL GAS MONITORS WORK?

Every LEL gas monitor comes with a built-in sensor. The most common LEL sensor is known as a Catalytic Bead Combustible sensor. It detects gas through a process of catalytic oxidation. In layman terms, the heart of a catalytic bead sensor is the wheatstone bridge circuit formed by the two catalytic beads. One is used as a reference and the other is active. Voltage is applied to this active bead which heats it to a point that readily sustains combustion. As detectable gas is introduced, the active bead heats up even more causing a measurable change in electrical resistance. This linear response becomes the LEL% reading on the gas monitor.

INSTALLING LEL GAS MONITORS IN THE WORKPLACE

Once the construction manager or business leader understands how LEL gas monitors work, they should install them either on their workers or throughout the site before the work begins.

The user should rst calibrate the monitor to the target gas so that the sensor is programmed to detect the gas most likely to in ltrate the workplace. They should then set an alarm on the gas monitor when the gas reaches a certain % LEL. For example, if the user sets the alarm to 30% LEL, the alarm will go o when the target gas has reached 30% of its lower explosive limit.

Most LEL gas monitors come with conservative default alarm settings, usually between 10% - 20%. Construction managers would be wise to keep the factory settings where they are or lower them. Conditions in the workplace can change quickly and most monitors are not equipped to detect what combination of gases may be in the air.

Most combustible gases will combust more easily when combined with other gases. For example: If an LEL sensor is calibrated with Methane gas, but the target gas is known to be pentane, which has a lower LEL of 1.8% Vol, the actual % LEL could be double what’s being reported on the monitor. The gas monitor may display 50% LEL, but it is actually closer to 100% LEL due to it being a di erent target gas.

Manufacturers have published charts detailing correction factors to adjust readout for speci c gasses. As a rule of thumb, managers should use conservative alarm settings to allow for inaccuracies and unknown conditions.

CHOOSING AN LEL GAS MONITOR

There are many types of gas monitors to choose from, but construction managers should select a monitor based on their application and budget.

When it comes to general contracting and compliance, many managers will use a 4-gas detector (pumped or di usion), such as BW’s GasAlertMax XT II or RKI’s GX-3R. Those working with varying combustibles should consider using a ToxiRaePro LEL. This unit has a built-in selectable library of correction factors for the user to choose from. More specialized gas monitors like RKI’s GX2012 will allow for more advanced tasks such as leak investigation (in PPM Levels) or purge testing (0-100% Vol).

Managers and business leaders should keep this information in mind throughout the construction process. Odorless, colorless combustible gases can easily leak into the workplace without anyone realizing it. Every site should have at least one LEL gas monitor in place to protect workers from harm.

Written by Rick Pedley - President and CEO, PK Safety
Contact Info: (800) 829-9580
Rick Pedley joined the family business in 1979. PK Safety, a supplier of occupational safety and personal protective equipment and manufacturer of its own new FR line GRIT, has been operating since 1947 and takes OSHA, ANSI, PPE and CSA work safety equipment seriously.