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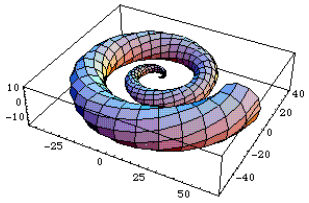

Ten things to consider before buying a gas monitor

Gas detection can be a confusing topic. Gas monitors are often used by people whose training is not in chemistry or the gas detection field, but since OSHA regulations require gas monitors be used in certain work situations, you may find yourself having to purchase and use a monitor of which the concepts may not be familiar.

This guide was written in an attempt to educate and simplify several basic aspects and features of gas monitors available to you.

Gas monitors are an essential piece of equipment in many jobs, and without gas monitors workers would have no way of detecting dangerous gases. It is certain that gas detection equipment saves numerous lives every year, and for this reason this is a piece of equipment that you just can't do without.

There are a multitude of dangers associated with gas exposure. For example Carbon Monoxide is the silent and deadly killer, aptly named because it can't be seen or smelled. There is no way to detect it except with a properly calibrated instrument. Carbon Monoxide poisoning can result in suffocation and possible death in minutes if the concentration is high enough.

Combustible gases can sometimes be smelled because of additives such as mercaptan that's added to natural gas to aid in its detection. However, Methane produced in its natural state is colorless and odorless. A search through news archives will attest to the importance of a gas monitor, by seeing the number of stories of explosions in industrial facilities around the world, many times fatal.

Toxic gases are another source of deadly gas exposure. These gases can suffocate you externally by displacing oxygen or suffocate you internally by entering your bloodstream and blocking oxygen from being carried through the blood. In addition to suffocation toxic gases can have a whole host of secondary effects such as rashes, eye irritation, nerve desensitization etc.

In addition to the health effects and potential death associated with gases, companies also have a financial stake in providing gas detection for their workers. Since OSHA passed laws requiring gas monitors in certain situations, companies can be issued large fines for not providing adequate protection. These fines can be assessed during an OSHA audit, or in the case of an injury or death. If a death or injury does occur, the company can be held liable for negligence, and be required to pay substantial amounts in damages in addition to the fines.

The only solution to these issues is to use a properly calibrated instrument configured with the appropriate sensors, for gases that may be present in the work area. This can be a somewhat intimidating task for someone unfamiliar with the concepts or technology. Hopefully this guide will shed some light on these.

1. **Number of Sensors.** The first thing you need to determine is how many sensors you need. This is going to be determined by the atmospheric hazards present in the workplace. For example, if you are buying a monitor for confined space applications you will more than likely need a four-gas monitor. The most common configuration for a four-gas monitor is Carbon Monoxide, Hydrogen Sulfide, Oxygen, and combustible gases. These are the most common atmospheric hazards that you are likely to encounter in a confined space. A single gas instrument would be inappropriate in this situation. For example, if you were welding in a confined space, and were using a monitor for combustible gas this would be insufficient because welding consumes oxygen. Your instrument would be incapable of alerting you to this hazard because the sensor will only detect combustible gases and not oxygen depletion.

   On the other hand, if you are working, for example, out in an open field on a pipeline, chances are the only sensors you would need are Hydrogen Sulfide and Combustible gases. There would be no need for Carbon Monoxide and Oxygen, and while it wouldn't hurt to have these sensors, it must be remembered that this is going to translate into higher maintenance costs, since it is going to be more expensive to calibrate and replace 4 sensors versus 2 sensors.

2. **What sensors do you need?** - This is going to be determined by an examination of the worksite. A qualified safety professional or industrial hygienist should make this determination. However when in doubt it is always better to overestimate. The standard gas monitor of today is a four-gas unit that contains Carbon Monoxide, Hydrogen Sulfide, Oxygen, and Combustible gas sensors.

3. **Batteries.** - Some thought should be given to the type of battery that powers the instrument. Rechargeable Nicad batteries are convenient, and for frequent use a good choice. However Nicads have two drawbacks: memory conditions and typically long charge times. Memory conditions develop when the instrument is placed on charge repeatedly without letting the battery fully discharge. For example, if an instrument is only used for an hour a day and then placed back on charge the unit will only run for an hour after several times of doing this. The best way to avoid this is to let the instrument fully discharge before charging. Alkaline batteries alleviate these problems, but if the instrument is used frequently this can become costly, as most units only run for a day or two on a set of alkalines. The advantage though, is if the instrument goes dead and you need more run time you just insert new batteries, instead of waiting hours for rechargeables. Increasingly, manufacturers are turning to Nickel Metal Hydroxide batteries. These offer faster charge times and don't suffer from the memory condition that Nicads do.

4. **Pump or no Pump, Internal or External**. - This is an important question. If the unit is going to be used to monitor areas that are not in the immediate space

surrounding the employee then you will need a sampling pump. Confined space entry often requires a sampling pump, since the confined space requires a sample be taken before entry and it could be 20 or 30 feet deep. If you determine that you need a sampling pump for your application, then you must make the decision of internal or external. Internal pumps are convenient and require no further power source since they run off of the same battery as the monitor. However, you must bear in mind that if the pump becomes clogged it usually renders the instrument unusable until fixed. This is less of a concern when the proper filtration is used on the end of the sample tubing. What often happens though, is the end filter will become clogged, someone takes this off, and finds that the instrument now works. They then use the instrument without this end filter, and eventually the internal pump becomes clogged.

External pumps are sometimes unwieldy, and usually require a second power source, but if you anticipate not needing a pump for most of your applications then this may be the way to go, since you won't have to worry about clogging the pump. Another advantage is the smaller size, if you don't need the pump frequently there's no sense in carrying around a larger instrument.

5. **Cost of Maintenance.** This is a subject that is very often overlooked when buying a gas monitor but is quite important. Maintaining a gas monitor is a costly proposition. You will need to set up some type of regular maintenance and calibration program. OSHA doesn't specify the frequency of calibration but allows the manufacturer to determine what is best. Most manufacturers recommend every thirty days and not to exceed every six months. You must factor in the cost of calibration gas, a regulator, and the labor spent if you are going to do it yourself. You can have an outside service do this if you are not comfortable doing it yourself. You must also maintain a calibration log stating when the unit was calibrated, any repairs made, and by who. This is vital, for in the case of an accident or OSHA audit, they will want to see the calibration log. Sensor replacement is another costly item that must be factored into your budget. Sensors have a finite lifespan and will need changing at various intervals. For example most oxygen sensors last 18-24 months. Oxygen sensors have a short lifespan because when they detect oxygen they produce a current. Since the sensor is constantly detecting oxygen the sensor dies faster than other sensors. Carbon monoxide sensors by comparison will only produce a current when there is CO present which is not likely to be continuous like oxygen. Typical lifespan of toxic sensors is three years, and four years for combustible sensors. Even though these sensors may not go completely dead like an oxygen sensor, it is recommended that they be changed at the manufacturers suggested interval since they become increasingly unstable as they age.

6. **Service.** This must be taken into consideration because, when the instrument is in need of service you will be without it for possibly up to several weeks, depending on what service facility it is sent to. You may need to make arrangements for a rental unit or may need to accommodate a different work schedule while the instrument is in the shop. A good idea is to keep a spare or two on hand to cover the shortage while an instrument is being repaired.

7. **Size.** This is a rather important aspect that may be overlooked. If an instrument is too big and bulky workers may not want to use it. This can be quite frustrating for a safety manager who has invested thousands of dollars on equipment to keep his workers safe, and then have it not used. Several gas related deaths have revealed that workers had a gas monitor, but weren't wearing it because they left it in their truck. Most workers that resist wearing the monitor resist because it is too big and bulky. On the other hand, if you are using an instrument to monitor an area containing several workers you may want a big instrument so that it isn't lost and is highly visible to all the workers.

8. **Complexity.** Just as size is a factor in getting employees to use the instrument so is complexity. If the instrument is unduly complex it's going to cause trouble. An instrument that is suited for an Industrial Hygienist may not be suited to a construction worker entering a confined space. If the instrument is being used improperly the safety it offers is negated, that is why it is important that all workers be trained on and understand the instrument that they are using. Ideally, functions such as calibration and alarm settings should not be obvious otherwise this may lead to employee tampering and incorrect functioning of the instrument.

9. **Data logging.** Data logging is when the instrument records gas levels at a periodic time; this could be every minute or every hour. These readings can then be downloaded to a computer and analyzed with graphs and spreadsheets. Data logging instruments are useful when an evaluation needs to be made of atmospheric conditions over time.

10. **TWA and STEL.** Twa (Time Weighted Average) and STEL (Short Term Exposure Limit) are two OSHA designations that define the maximum amount of gas a worker may be exposed to over a set period of time. STEL is the maximum amount of gas a worker may be exposed to over a 15-minute period. For example the STEL of Carbon Monoxide is 200PPM.

    TWA is the average amount of gas a worker can work in over an eight-hour work shift. The TWA of Carbon Monoxide is 35 PPM over eight hours. Some instruments calculate STEL and TWA and some do not. Preferably you should look for an instrument that contains this feature.

Hopefully, these ten steps have begun the process of pointing you in the right direction towards the correct gas monitor for your situation. If your still unsure what monitor is right for you, don't hesitate to call us at 1-877-580-3728. We're here to help and we understand that your background may not be in gas related equipment. We will work to help you understand your particular gas situation and the best solution for it.