A Confined Space is a Confined Space is a Confined Space...

With somewhere in the neighborhood of 10 million people employed in construction, it is one of the largest industries in the United States. That's a lot of people to send home safe every day. Construction worksites present a number of potential safety hazards, and with increased awareness employers are now emphasizing safe work habits to reduce injuries. Although it is standard practice that workers are outfitted with all kinds of personal protective equipment (PPE) such as gloves, hard hat, safety glasses, steel toed boots, safety clothing, fall arrest harness, etc., the safety record in construction is below average. According to U.S. Department of Labor statistics, in 2006 the cases of work related injury and illness was 5.9 per 100 full time construction workers; significantly higher than the 4.4 per 100 worker rate found in the entire private sector.

An often overlooked article of PPE in the construction industry is the personal safety gas detector. The Occupational Health and Safety Administration (OSHA) has been working for years to heighten awareness of the hazards presented by confined spaces that are encountered on construction worksites. On November 28, 2007, OSHA presented a proposed rule draft dealing specifically with confined spaces in construction. Before implementing the proposed rules, OSHA invited input from the construction industry and the deadline for submissions has just passed.

The confined space rules for general industry were introduced in 1993, however these do not apply to construction employers, and do not provide the appropriate level of employee protection based on the hazards created by construction activities performed in and around confined spaces. Employees in construction that perform work in confined spaces face a significant risk of death or serious injury. The proposed rule will substantially reduce this risk. OSHA estimates that in the US there are 641,000 entries by construction workers into confined spaces annually, and that each year there are an average of 6.44 worker fatalities and 967 related injuries in confined spaces.

The construction workplace environment is unique and presents challenges not experienced in other industries. Unlike most general industry worksites, construction worksites are continually evolving and as changes occur, so can the characteristics of confined spaces. It is also common to find multiple contractors and multiple construction disciplines working at a site managed by a single controlling contractor. Construction generally experiences higher employee turnover rates, and many workers perform short-term tasks at multiple worksites. To address the unique characteristics of the construction industry OSHA has created 29 CFR Part 1926, Confined Spaces in Construction; Proposed Rule.

The proposed rule requires employers to determine whether a jobsite has a confined space, identify the existing and potential hazards, and to exchange information with all contractors involved in a project. OSHA believes the existing general industry standard for permit-required confined spaces is not adequate, and the new proposal outlines four different types of confined spaces encountered in construction:

1) A Continuous System-Permit-Required Confined Space (CS-PRCS) is a confined space that is part of, and contiguous with, a larger confined space (for example, sewers) that the employer cannot isolate from the larger confined space. It is also subject to a potential hazard release from the larger confined space that would overwhelm personal protective equipment and/or hazard controls.

The least favourable conditions should be assumed to exist during every confined space entry.

2) A Permit-Required Confined Space (PRCS) is a confined space that has any one of the following: A hazardous atmosphere that ventilation will not reduce to and maintain at a safe level; inwardly-converging, sloping, or tapering surfaces that could trap or asphyxiate an employee; or an engulfment hazard or other physical hazard.
3) A Controlled-Atmosphere Confined Space (CACS) is a confined space where ventilation alone will control its atmospheric hazards at safe levels. Note also that a confined space cannot be classified as a CACS if it has a physical hazard (unless that hazard has been isolated).
4) An Isolated-Hazard Confined Space (IHCS) is a confined space in which the employer has isolated all physical and atmospheric hazards. "Isolated" means the elimination or removal of a physical or atmospheric hazard by preventing its release into a confined space.

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The employer has the option to classify a confined space in any of the four classifications providing all of the characteristics and requirement for that classification are met. The "Controlling Contractor" is the employer that has overall responsibility for the project. When employing multiple contractors on worksites, it is the controlling contractor's responsibility to coordinate entry operations among contractors who have employees in a confined space regardless of whether or not the controlling contractor has employees in the confined space.

In the 1994 study paper, "Worker Deaths In Confined Spaces", the National Institute for Occupational Safety and Health (NIOSH) states, "Atmospheric conditions such as the presence of toxins, or lack of oxygen, contributed to over half of the confined-space-related deaths". Atmospheric hazards are the number one cause of fatalities in confined spaces, although other hazards such as mechanical equipment with moving parts, engulfment and slips and falls must also be taken into consideration. Unfortunately, most confined space accidents can be attributed to ignorance of the hazard potential.

Since most atmospheric hazards are imperceptible to human senses, it is necessary to assess the confined space atmosphere with an appropriate electronic gas detector. The least favorable conditions should be assumed to exist during every confined space entry. The possibility of explosion, poisoning and asphyxiation cannot be ignored.

Atmospheric hazards to be aware of are oxygen depletion, or enrichment, toxic/poisonous and combustible gases. These conditions may be present prior to entry, or they can arise suddenly any time during occupation of the confined space. Often work being performed in a confined space, or activity near confined spaces can contribute to changes in atmospheric conditions.

Continued on Page 6

Once the atmospheric risks have been assessed, always use an appropriate gas detector to monitor the environment. A basic understanding of the gases that can be encountered and the hazards they present is essential. The majority of confined space entries involve interrogating the atmosphere for oxygen concentration, toxic contaminants and combustible gases. The most common configuration in a portable gas detector used for routine confined space entry includes oxygen, combustible (%LEL), hydrogen sulfide and carbon monoxide sensors. But not all applications are the same and the types of sensors selected should reflect the known and potential atmospheric hazards associated with the confined space. Many detectors available today offer a wide selection of sensor options to provide worker protection. Since confined space entry is the largest single market for portable gas detectors, gas detection manufacturers put huge emphasis toward developing products for this application; there are various options available for consideration when selecting a monitor to suit your needs.

How to obtain a sample from the confined space atmosphere to determine whether or not it is safe to enter is a key consideration. All gases have a vapor density and in comparison to normal air, some gases are heavier than air, some are lighter and some have a comparable density. Based on vapor density, gases in a confined space will stratify, so obtaining a representative sample at various levels prior to entry is imperative.

Obtaining a representative air sample from a confined space can be achieved by different methods. The most primitive method still in use is actually lowering a portable detector into the space on a rope, retrieving it and checking peak readings. But detectors can be physically damaged if they swing against walls, hit ladder rungs, or come into contact with water or mud at the bottom. Currently, remote sample draw systems are more commonly used for obtaining "pick hole" samples before opening a confined space cover and for sampling the atmosphere at a specific point or level. Two types of remote sample draw systems are generally available: motorized pump and manual hand aspirated squeeze bulb. Manually aspirated squeeze bulbs with attached tubing enable the user to bring the sample to the sensors. This method can be quite arduous and it can take a large number of squeezes to properly assess the hazard. The motorized pump provides the easiest method for drawing a sample from a remote location. Motorized pumps can be integral or external to the portable safety gas detection instrument.

The sensors in a portable safety gas detector can only detect gases that actually reach the sensors. For an instrument to accurately determine the concentration of oxygen and other contaminant gases that may be present in a confined space, the sample must first reach the sensors and enough time must be allowed for the sensors to fully stabilize their readings. Whichever remote sampling technique is employed, always follow the manufacturer's instructions. Any failure in the sample draw system such as leakage, pump failure, improper assembly or absorbance of contaminants in the system being used can lead to dangerously inaccurate readings. Since most failure modes produce readings that are lower than actual concentration, proper testing of the sample draw system is critical. Once a confined space has been declared safe and workers enter that space, it is essential to continue monitoring the atmosphere continuously. Ideally each worker in a confined space should be outfitted with a personal multi-gas detector as part of their everyday personal protective equipment (PPE). Many gas detection manufacturers devote a significant portion of their research and development dollars toward the design of smaller, less expensive personal detectors. Workers in confined spaces are often encumbered with a lot of PPE. Today there are standard 4-gas detectors available that are extremely compact and lightweight. The smaller the detector, the less likely there will be employee opposition to donning yet another piece of protective equipment. And with lower pricing in the market, it is more affordable for employers to protect employees facing atmospheric gas hazards. The ideal confined space gas detection package should include an appropriate multi-gas detector with either a built in or external motorized pump for initial interrogation and sentry monitoring, and individual small, lightweight diffusion multi-gas detectors for each employee.

Extremely compact and lightweight 4-gas detectors are easy to use and comfortable to wear.

The proposed OSHA standard provides minimum health and safety requirements and procedures to protect employees who work in, or near confined spaces. The standard includes requirements for training, hazard analysis, classification, entering, working, exiting and rescue for confined spaces of various levels. OSHA predicts that when the new rules are properly implemented by construction employers, the average number of fatalities and injuries in confined spaces covered by the proposed rule will be reduced by 90%. That means 6 more workers will stay alive, and 880 injuries will be prevented annually.

Most confined space deaths that result from exposure to lethal atmospheric conditions could have been prevented with proper training and the implementation of safe confined space entry procedures. Ignorance and complacency are deadly ingredients when it comes to workplace safety. Be Safe. Be Aware. Don't become an industrial fatality statistic.

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Failsafe detection of hydrocarbons

Featuring the latest infrared technology, the Polytron Pulsar Open Path Gas Detector from **Draeger** (Germany) is able to detect hydrocarbon leaks within a line of sight of up to 200m. Designed to provide failsafe detection of a wide range of hydrocarbons, this robust unit has built-in directional guidance and can be both aligned and commissioned without the need for special training.

Explosion proof and ideal for the detection of the alkane series, from methane to hexane, as well as propylene, methanol, ethanol and ethylene, the Polytron Pulsar is easy to use and can be commissioned by just one person. The integral calibration requires no manual adjustment or standard test gas and the alignment and signal strength parameters can be logged and used to determine optimum operating conditions.

Carrying a Safety Integrity Level rating of 2 (SIL 2) and offering a response time of less than two seconds, the Polytron Pulsar is designed to ensure that all faults are detected, thereby providing failsafe protection.

A continuous signal between the receiver and transmitter allows the system to adapt to difficult environmental conditions, and high power xenon lamps, combined with a sophisticated algorithm which varies their intensity and frequency, makes the unit immune to solar radiation, stack flares, arc-welding and resonance effects from rotating machinery. Impervious to the effects of fog, mist and snow across the beam, it also features heated optics to eliminate snow and icing and prevent condensation.

The internal data logger maintains a detailed record of the previous 7 days of operation, and consolidates records for the previous 32 weeks. Containing essential information, these records can include actual readings, events such as beam block and gas alarms, warning flags, signal strength, alignment, supply voltage and internal temperature.

Digital communications between the field and the safe area can also be provided, without the need for extra cable cores, by the addition of HART. Enabling a complete installation to be monitored from a single workstation, a HART configured system provides real time information on the status of an individual detector as well as configuration and historical data of each device. Useful when planning maintenance, HART can also provide substantial cost savings, particularly where detectors are located in hard to reach areas.

In addition, gas calibrations and the signal span can be accessed and changed remotely with an AI500 digital interface. For larger installations, up to 32 AI500 devices can be connected via an RS485 interface to allow up to 128 Polytron Pulsar units to be monitored.

Meeting ATEX, IECEx UL, CSA and GOST approvals, the Polytron Pulsar can be supplied with a variety of operating distances from 4 to 60m, 30 to 120m or 100 to 200m and is designed for use in temperatures ranging from –40 to +60°C.