

# Compliance

Magazine™

## A Matter of Accuracy: Regular Instrument Calibration Keeps Air Monitoring Programs in Compliance With OSHA Standards

By Thomas Suski

Every day, workers in a variety of industries face the invisible threat of atmospheric hazards as they enter confined spaces. These hazards have significantly contributed to confined space accidents and fatalities, and the fatality-to-injury rate is much higher than with most other types of workplace accidents. To address these dangers, OSHA's confined space standards include a number of methods and procedures for limiting exposure to unsafe oxygen levels, as well as combustible and toxic gases.

A consistent element stated throughout OSHA's air monitoring standards is that workers must use a gas monitoring instrument capable of alerting them to the presence of atmospheric hazards. The instrument monitors potentially dangerous conditions that are not accurately detectable through any of the five human senses and are capable of changing rapidly. However, possessing and properly using a gas detection instrument is not enough to ensure safe working conditions. The instrument must also be properly calibrated. Only then, can you be certain that the instrument will accurately respond when exposed to hazardous concentrations of gas.



### Detecting the Hazards

Earlier this year, OSHA posted a Safety and Health Information Bulletin, which underscores the criticality of regular instrument calibration for accurate atmospheric monitoring. Understanding OSHA's bulletin on instrument calibration is tantamount to

understanding the environmental dangers inherent to confined spaces. For optimum safety, oxygen levels in confined spaces should be neither low enough to cause asphyxiation nor high enough to cause a potential explosion. A number of other combustible gases can pose an immediate threat, especial-

ly when welding or performing other “hot work” tasks that require the use of a potential ignition source. Also, confined space workers are in danger of asphyxiation from a number of toxic gases such as carbon monoxide and hydrogen sulfide.

The potential for such hazards can be significantly reduced and, many times, virtually eliminated if confined space requirements are carefully followed. OSHA’s Federal Register, 29 CFR 1910.146 states that before an employee enters a permit required confined space “the internal atmosphere shall be tested, with a calibrated direct reading instrument, for the following conditions in the order given: (1) oxygen content, (2) flammable gases and vapors and (3) potential toxic air contaminants.”

Use of the word “calibrated” here represents a clear understanding that inaccurate readings and compromised safety are much more likely to come from a gas monitor that has not been properly tested by exposing its sensors to a known concentration of gas. OSHA’s information bulletin states that these inaccurate gas concentration readings could lead to injury or death and that avoiding this is the primary reason for calibration.

**Accuracy Achieved Through Calibration**

OSHA refers to the instrument’s response to calibration gas exposure as

its “reference point,” or the point where all atmospheric gases will be measured and compared. When an instrument’s reference point shifts, its readings also shift and become inaccurate. This is known as “calibration drift,” a condition that can be caused by chemical degradation of sensors, drift in electronic components, exposure to extreme environmental conditions, exposure to high concentrations of target gases, or exposure to poisons and inhibitors. When calibration drift occurs, as it does in all instruments over time, the device is still capable of measuring gas concentrations. The problem, however, is in the accuracy of the numeric reading. Performing a full calibration resets the instrument’s reference point and ensures accurate readings, which are vital to worker safety.

Ultimately, the user should refer to the instrument manufacturer for recommendations concerning how often an instrument should be calibrated. However, OSHA’s information bulletin does include a position statement from the International Safety Equipment Association (ISEA), a trade association for manufacturers of protective equipment, which states that “A bump test or full calibration of direct-reading portable gas monitors should be made before each day’s use in accordance with the manufacturer’s instructions, using an appropriate test gas.” A bump test is

a method of testing an instrument’s sensors with a concentration of gas high enough to cause the instrument to alarm. If the instrument fails to alarm, or its reading does not coincide with the measure of gas as indicated on the test cylinder, a full calibration must then be performed to adjust the instrument’s reading.

**Focus on Compliance**

To help end users keep their instruments in proper working condition, instrument manufacturers have designed automated instrument management and maintenance stations that can do everything from battery charging and bump testing to full calibration, data downloading and record keeping. While these systems can provide convenience and peace of mind, workers still need to be trained on using the instrument and performing OSHA recommended procedures such as confined space pre-entry testing.

Regardless of whether instrument maintenance is performed automatically or manually, regular instrument calibration is imperative to keeping gas monitoring equipment in compliance with OSHA standards. **CM**

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