

ISEA Statement on Validation of Operation For Direct Reading Portable Gas Monitors

The International Safety Equipment Association (ISEA) is the leading national organization of manufacturers of safety and health equipment including environmental monitoring instruments. ISEA is dedicated to protecting the health and safety of all workers through the development of workplace standards and the education of users on safe work practices and exposure prevention.

ISEA has developed this statement to ensure definition consistency in all documentation, and to emphasize the need to validate the operational capability of portable gas monitors. The statement reflects current instrumentation technologies and monitoring practices. Specifically, the statement intends to:

- a. Define and clarify the differences between bump test (function check), calibration check, and full calibration;
- b. Clarify when these validation methods are to be performed; and
- c. Reemphasize to users, regulatory agencies and standards writing bodies the importance of validating the operational capabilities of portable gas monitors used to examine the atmosphere in potentially hazardous locations.

1. Definitions

- a. **Bump Test (Function Check)** - A *qualitative* function check where a challenge gas is passed over the sensor(s) at a concentration and exposure time sufficient to activate all alarm indicators to present at least their lower alarm setting. The purpose of this check is to confirm that gas can get to the sensor(s) and that all the alarms present are functional. This is typically dependent on the response time of the sensor(s) or a minimum level of response achieved, such as 80% of gas concentration applied. Note this check is not intended to provide a measure of calibration accuracy.
- b. **Calibration Check** - A *quantitative* test utilizing a known traceable concentration of test gas to demonstrate that the sensor(s) and alarms respond to the gas within manufacturer's acceptable limits. This is typically $\pm 10\text{-}20\%$ of the test gas concentration applied unless otherwise specified by the manufacturer, internal company policy, or a regulatory agency.
- c. **Full calibration** – The *adjustment* of the sensor(s) response to match the desired value compared to a known traceable concentration of test gas. This should be done in accordance with the manufacturer's instructions.

2. Recommended Frequency

- a. A **bump test (function check)** or **calibration check** of portable gas monitors should be conducted before each day's use in accordance with the manufacturer's instructions.

Any portable gas monitor which fails a bump test (function check) or calibration check must be adjusted by means of a full calibration procedure before further use, or removed from service.

- b. A **full calibration** should be conducted at regular intervals in accordance with instructions specified by the instrument's manufacturer, internal company policy, or a regulatory agency.

- c. Validation of an instrument's operability should be conducted if any of the following conditions or events occurs during use:
- i. Chronic exposures to, and use in, extreme environmental conditions, such as high/low temperature and humidity, and high levels of airborne particulates.
 - ii. Exposure to high (over range) concentrations of the target gases and vapors.
 - iii. Chronic or acute exposure of catalytic hot-bead LEL sensors to poisons and inhibitors. These include volatile silicones, hydride gases, halogenated hydrocarbons, and sulfide gases.
 - iv. Chronic or acute exposure of electrochemical toxic gas sensors to solvent vapors and highly corrosive gases.
 - v. Harsh storage and operating conditions, such as when a portable gas monitor is dropped onto a hard surface or submerged in liquid. Normal handling/jostling of the monitors can create enough vibration or shock over time to affect electronic components and circuitry.
 - vi. Change in custody of the monitor.
 - vii. Change in work conditions that might have an adverse effect on sensors.
 - viii. Any other conditions that would potentially affect the performance of the monitor.