



Simple Function Test Will Save Lives

Stephen Mellor, Product Specialist, Air Products Specialty Gases
 Tel: 01905 758200 • Email: mellors1@airproducts.com • Web: www.airproducts.co.uk/oneuse

Carrying out a function test to make sure portable gas detection equipment is working properly in any process environment is relatively easy to do and takes only a few seconds. Not doing it, however, could have serious consequences and even end up costing lives.

For petrochemical producers, the potential hazards caused by a gas leak, which could lead to the build-up of toxic or flammable gases in the atmosphere, or a dangerous reduction in oxygen levels, mean that effective gas detection systems are vital.

In view of its importance, it would be easy to assume that process managers who rely on equipment to detect flammable, toxic, or harmful atmospheres, carry out rigorous checks to ensure it is working properly. The plain fact is not all of them do. And the catalogue of tragic incidents or near-misses shows that work still needs to be done to encourage industrial users of gas detection equipment to adopt a function testing policy as part of a responsible operating regime.

Virtually all the world's largest manufacturers of personal gas detection equipment recommend that equipment is tested each day before use and they are required by European law to provide a means of doing so. In Europe there is also key guidance documents (BS EN 60079-29-2:2007) covering the selection, installation, use and maintenance of detectors for flammable gases. It states: "Inspection and field checks are intended to verify that the apparatus is in a working state. It is recommended that it is done by personnel actually operating the apparatus and it is strongly recommended that it is performed each day of use particularly if the apparatus has catalytic, electrochemical or semiconductor sensors and is being used under arduous conditions."

It is important to undertake regular function testing to prove that gas detection instruments are working correctly. Gas detectors may go wrong for a variety of reasons and all manufacturers agree that it is necessary to check portable gas detectors between calibrations. In some instances, detectors are used in harsh environments and may be exposed to physical damage, the sensor ports may become obstructed or damaged, or there might be a manufacturing problem.

When gas detectors fail, many fail in an unsafe way, with portable instruments particularly vulnerable due to the nature of their use. It is unsafe because, if the sensors fail, the user has no way of knowing. There's no alarm to signal that the equipment is not working and, crucially, the user will be unaware that a gas leak or a hazardous gas build-up has occurred. It is also important to note that catalytic flammable sensors and electrochemical sensors fail to zero output – meaning that the instrument reading remains at zero when hazardous gas is present.

Over the last two years there have been a number of high-profile incidents where things have gone tragically wrong. While not all relate to gas detectors failing, they bring home all too clearly the potential hazards.

One of the most recent examples was in November 2012 when a UK firm was fined for putting employees in danger by allowing them to work in confined spaces without relevant training or safety measures. In a statement, the Health and Safety Executive said its inspectors "found a gas analyser, used to ensure that the atmosphere in the pit was safe, had not been calibrated to ensure its accuracy".

And in 2010, 29 workers were killed at a coal mine in New Zealand following a blast caused by a methane gas explosion. A Royal Commission report into the incident said "the tragedy was preventable but administrative and regulatory reforms are urgently needed to reduce the likelihood of further tragedies". The report said the systems and infrastructure necessary to produce coal safely "had not been completed," adding that workers were exposed to "unacceptable risks" because health and safety was not adequately addressed in a drive to achieve production.

The only way to check that a gas detector is working and can respond to the target gas is

by function testing or 'bump testing' as it is sometimes known. This involves the use of a special test gas mixture containing specific quantities of each of the gas components that the equipment is being used to detect. Ideally the test should be carried out by the user of the equipment each day before it is used or it may be carried out by a technician in a calibration workshop.

Gas detection equipment is used across a wide range of industries including chemicals, utilities, water, tank repair, oil plants and petrochemicals, mining, pulp and paper and pharmaceutical laboratories. It also applies to other industries where employees work in a confined space, or in any environment where there is the potential for an explosive or toxic atmosphere, or a risk of oxygen concentrations being depleted to harmful levels. The systems detect flammable gases, like methane and propane, toxic gases such as hydrogen sulphide, sulphur dioxide and chlorine, as well as oxygen depletion.

'Bump testing' is easy to carry out. Manufacturers typically include a methodology for performing a functional check, in the user manual.

Air Products supplies test gases in highly portable and easy-to-use, non-refillable cylinders, which in most cases can be used to carry out several hundred bump tests before needing to be replaced. Being light-weight is important and means that function testing can be carried out easily in the field or in a workshop. In addition, no tools are needed to connect the gas control equipment to the canister and these can range from the largest holding 110 gas litres, to the smallest 12 litre aerosol. They are compliant with current European standards and legislation, robust and reliable, and offered with gas control equipment suitable for either diffusion instruments, or units fitted with internal pumps. Custom and standard gas mixtures and pure gases are available, providing mixture accuracy, optimum stability and maximum shelf life.

As part of its commitment to gas safety, Air Products has recently been involved in the development of a guide* covering the use and calibration of monitors for gas detection for the Council of Gas Detection and Environmental Monitoring (CoGDEM).

This guide states: "Industrial gas detectors form an important part of safety systems designed to protect users from the harmful effects of flammable, toxic or asphyxiant gases. These gases can cause explosions, damage to health, or deplete the oxygen content of the air. Consequently, accurate gas detection is vital for protecting human life as well as process plant and the environment."

Hard statistics are rather thin on the ground, but there is an abundance of anecdotal stories about poor or even absent safety procedures, with gas detection equipment being dug out of storage and not being checked. Every year gas-related accidents mean people die unnecessarily and property is damaged.

The message is simple – 'bump testing' must be included in every gas safety system. Carrying out regular before-use checks will give operators the confidence and peace of mind that the equipment they are relying on is actually working. Without a 'bump test', they won't know it's not working, until it doesn't. And if the atmosphere is toxic, flammable or oxygen deficient, that could be too late.



Stephen Mellor, Author