



Hydrogen – safety for the energy source of the future

Hydrogen is seen as a decisive factor in the energy transition and in achieving our climate goals. As countries around the world develop strategies to promote the hydrogen economy and capitalise on the economic opportunities, the safe handling of this promising energy source is becoming a key focus. Hydrogen poses particular safety challenges due to its properties, such as its high explosiveness. Innovative gas measurement technology is used to optimise safety when handling, storing and transporting hydrogen to effectively protect people and the environment.

Hydrogen production, storage and transport

Safety risks in hydrogen technology arise in particular when producing, storing and transporting it. In its production, the high reactivity of hydrogen poses risks, especially in electrolysis and steam reforming, where high pressures and temperatures prevail. In storage, the focus is on managing potentially explosive hydrogen-air mixtures and storage tank integrity. The transport of hydrogen by pipeline or in pressurised mobile containers also requires special attention due to the risk of leakage and consequent ignition. Advanced safety measures and technologies are essential to ensure the safe handling of hydrogen in all these areas.

Safety challenges

Explosion protection

The main hazard when handling hydrogen is the risk of explosion. Hydrogen is the only gas classified in explosion group IIC and temperature class T1. The lower explosion limit (LEL) is only 4% by volume. Equipment must therefore be suitable for use in potentially explosive atmospheres and certified accordingly.

Leaks

Due to its small molecular size and low viscosity, hydrogen can quickly escape from pressurised gas pipes and containers. In addition to proper design and construction, maintenance and regular system inspections are essential to ensure safety. Fixed gas detection and early warning systems provide additional safety.

Permeation

Hydrogen is the smallest of all molecules and can easily permeate through materials. However, hydrogen has been safely stored, transported and used for centuries. The correct selection, handling and maintenance of materials is crucial.

CO-alarms

Carbon monoxide (CO) sensors are cross-sensitive to hydrogen. CO sensors located in close proximity to hydrogen should be tuned to minimise cross-sensitivity or false alarms. Failure to do so may result in false CO alarms due to hydrogen. Dräger offers hydrogen compensated CO sensors.

Gas clouds

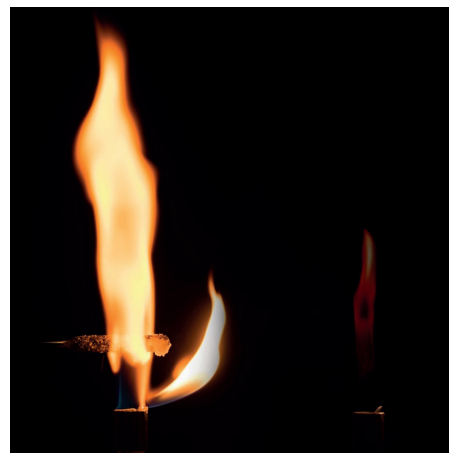
Hydrogen is less dense than air and will form gas clouds on interior ceilings during leaks. Gas detection technology is therefore usually installed in the ceiling area. For ease of operation and maintenance, remote solutions with remote sensors are a good solution. It is important to note that infrared technology is not suitable for measuring hydrogen and CatEx sensors should be used instead.

Odourless

Hydrogen is not only colourless, but also odourless and cannot be perceived by humans. Only gas and leak detection technologies detect it reliably.

Pale flame

Hydrogen flames are very pale and barely visible in daylight. Hydrogen fires are reliably detected by flame detectors. Due to their special reaction products, flame detectors with triple IR sensors are particularly suitable for detecting hydrogen flames.



Detection technologies and solutions for safe hydrogen handling

The right equipment, materials, and protective measures can meet these special safety challenges. Dräger provides comprehensive safety solutions, from portable gas detection devices to fixed fire and gas detection systems, from consulting and project planning to maintenance services. For any questions regarding hydrogen measurement, please contact your local Dräger sales organisation.

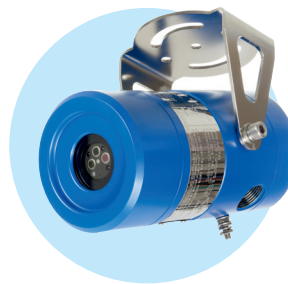
Fixed gas detection:



Dräger Polytron® 8200 CAT
Flammable Gas Detector



Dräger Polytron® 8900
Ultrasonic Gas Detector



Dräger Flame 1750 H₂ (IR3)
Flame Detector



Dräger Polytron® 6100 ECWL
Wireless Gas Detector



Dräger PEX 3000
Flammable Gas Detector



REGARD® 3000
Controller

Portable gas detection:



Dräger Pac® 8000 H₂
Single Gas Detector



Dräger X-am® 5800
Multi Gas Detector



Dräger X-am® 8000
Multi Gas Detector



Further information on hydrogen safety can be found here:
www.draeger.com/hydrogensafety