Hydrogen – challenges for gas detection technology

Hydrogen is seen as a key element for a successful energy transition. To meet climate goals while simultaneously tapping into business potential, many countries have already developed hydrogen management strategies. When handling hydrogen, however, some safety aspects must be taken into account.

PRODUCTION, STORAGE AND TRANSPORTATION:

Hydrogen can be produced from various primary sources. Current trends show that hydrogen could play a determining role in energy systems in the future. Due to its low volumetric energy density, hydrogen is liquefied or bound in salt caverns as a pressurised gas, e.g. stored in metal hybrids. Many such topics are still undergoing research and development. Hydrogen is mainly transported by truck, as compressed gas or liquefied, and in pipelines dedicated to hydrogen, or a mix with natural gas.

THE SAFETY CHALLENGES OF HYDROGEN

EX-Protection:

The major threat with hydrogen is that it could cause an explosion. Hydrogen is the only gas classified in the explosion group IIC and the temperature class T1. Equipment must therefore be **suitable** and **certified** accordingly for use in these Ex areas.

Leaks:

Due to its small molecule size and low viscosity, hydrogen can escape quickly from pressurised gas pipes and containers. Besides proper design and construction, regular maintenance and system inspections are essential for ensuring safety. Fixed gas detection technology and early warning systems provide additional security.

Permeation:

Hydrogen is the smallest of all molecules and can easily penetrate materials. However, hydrogen has been stored, transported and used for centuries. Appropriate selection, handling and maintenance of materials are crucial.

CO Alarms:

Carbon monoxide (CO) sensors are cross-sensitive to hydrogen. CO sensors that are in close proximity to hydrogen should be compensated for this so that any cross sensitivities or false alarms can be reduced to a minimum. Otherwise, false CO alarms may be triggered due to hydrogen. Dräger offers hydrogen-compensated CO sensors.

Gas Clouds:

Ammonia, methane and hydrogen all have a lower density than air and form gas clouds on interior ceilings if leakages occur. Gas detection technology is therefore usually installed above. Methane-hydrogen mixtures can form hydrogen clouds above methane.
Hydrogen detectors should continue to be installed above and methane (IR) detectors under possible hydrogen clouds. Alternatively, CatEx sensors should be used.

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 by daylight are either invisible or barely visible. Flame detection reliably warns of hydrocarbon- and hydrogen-based fires.

DETECTION TECHNOLOGIES AND SOLUTIONS FOR HYDROGEN MANAGEMENT

These special safety challenges can be met by the right selection of equipment, materials and protective measures. 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.

PORTABLE GAS DETECTION

Dräger Pac® 8500
Single Gas Detector

Dräger X-am® 5600
Multi Gas Detector

Dräger X-am® 8000
Multi Gas Detector

FIXED GAS DETECTION / WIRELESS DETECTOR / CONTROLLER

Dräger PointGard 2200
Flammable Gas Detector

Dräger PEX 3000
Flammable Gas Detector

Flame 2700 (Multi-IR)
Flame Detector

Polytron 8900 UGLD
Ultrasonic Leak Detector

Polytron 6100EC WL
Wireless Gas Detector

REGARD 7000
Controller

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