MSA
The Safety Company

Hydrogen Gas & Flame Hazard Monitoring Solutions

Application Note

WE KNOW WHAT'S AT STAKE.

The Growing Importance of Hydrogen

Hydrogen (H_2) demand is growing worldwide as a renewable fuel for electric power generation and electric vehicles (maintenance, repair, and storage facilities, refueling stations). Hydrogen is also found in battery power rooms at critical facilities such as data centers and aeronautical facilities.

Conventional uses of H_2 include petrochemical feedstocks and catalysts to produce ammonia (fertilizer), methanol (antifreeze, solvents), hydrogen sulfide (coolants, lubricants), paraffins, alkanes, and low-sulfur diesel or biodiesel fuels. It is also used in metals and glass production.

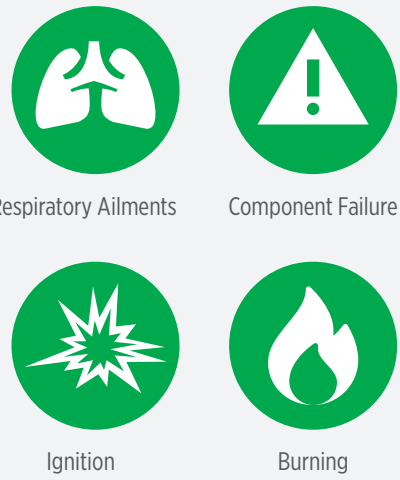
Under normal conditions, H_2 is colorless, odorless, tasteless, and non-poisonous. In high concentrations, however, hydrogen can lead to oxygen (O_2) deficiency and asphyxiation. When heated, it is also easily combustible and highly flammable—a severe fire threat.

Hydrogen Hazards

Hazards associated with hydrogen include respiratory ailments, component failure, ignition, and burning. Although a combination of hazards occurs in most instances, hydrogen's primary hazard is production of a flammable mixture that can lead to fire or explosion. As hydrogen's minimum ignition energy in air at atmospheric pressure is approximately 0.02 mJ, hydrogen is easily ignited.

In addition, hydrogen can produce mechanical failure of containment vessels, piping and other components due to hydrogen embrittlement. Long-term hydrogen gas exposure may result in some metals and plastics loss of ductility and strength, leading to formation of cracks and eventually, possible ruptures. A form of hydrogen embrittlement takes place via chemical reaction; at high temperatures, hydrogen reacts with one or more components of metal walls to form hydrides that weaken the material's lattice structure.

Hydrogen Hazards



Reliable H_2 Gas and Flame Monitoring Systems

Hydrogen gas is often difficult to detect and monitor because it is lighter than air and difficult to detect where accumulations cannot occur, nor is hydrogen gas detectable via infrared gas sensing technology. In buildings or enclosed spaces, it rises quickly. If a hydrogen leak ignites, hydrogen flames emit very little visible light or infrared radiant heat, making them even more challenging to detect compared to hydrocarbon fires. For this reason, combustible hydrogen gas and flame detectors are placed near the ceiling, while O_2 and other gas sensors are placed closer to the floor where people work. MSA's modular family of gas and flame monitoring systems also includes highly intelligent controllers, which are cloud-ready for 24/7 remote monitoring and designed to alert fire suppression systems. They feature precision gas/flame detection technologies with LEL and ppm accuracy, as well as wide field-of-view optical flame monitoring to quickly detect, annunciate, and suppress a dangerous hydrogen gas ignition event.

TG5000 Gas Detector

The TG5000 Gas Monitor is an effective and economical solution for detecting combustible H_2 and other toxic gases, as well as oxygen deficiency. Designed for single or dual gas sensing, it features a rapid, reliable response in the presence of dangerous gases with a variety of sensor and configuration options.

FL500-H2 UV/IR Flame Detector

The FL500-H2 UV/IR Flame Detector specifically monitors for radiation emitted by a hydrogen flame in both the ultraviolet (UV) and infrared (IR) spectral ranges. This UV/IR combination provides a fast response time and increased false alarm immunity against sources of radiation for reliable protection and is capable of detecting other hydrocarbon fires as well.

Remote Monitoring & Notification

The FieldServer FGFD ProtoAir wireless gateway provides instant IIoT remote monitoring capabilities and is pre-configured with MSA's fixed gas and flame detection (FGFD) products to seamlessly enable cloud communications. Integrated MSA Grid support enhances the ProtoAir's value by enabling remote monitoring, control, cloud-based alarm notifications (SMS or email) for trouble or alarm conditions and data visualization through Grid dashboards.

MSA—The Safety Company

Established in 1914, MSA Safety Incorporated is the global leader in the development, manufacture, and supply of safety products that protect people and facility infrastructures. Many MSA products integrate a combination of electronics, mechanical systems, and advanced materials to protect users against hazardous or life-threatening situations. The company's comprehensive product line is used by workers around the world in a broad range of markets, including the oil, gas, and petrochemical industry, the fire service, the construction industry, mining, and the military. MSA's core products include self-contained breathing apparatus, fixed gas and flame detection systems, portable gas detection instruments, industrial head protection products, firefighter helmets and protective apparel, and fall protection devices. With 2020 revenues of $1.35 billion, MSA employs approximately 5,200 people worldwide. The company is headquartered north of Pittsburgh in Cranberry Township, PA, and has manufacturing operations in the United States, Europe, Asia, and Latin America. With more than 40 international locations, MSA realizes approximately half of its revenue from outside North America. For more information visit MSA's web site at www.MSAsafety.com.

Our Mission

MSA's mission is to see to it that men and women may work in safety and that they, their families, and their communities may live in health throughout the world.

MSA: WE KNOW WHAT'S AT STAKE.

MSA operates in over 40 countries worldwide. To find an MSA office near you, please visit ***MSAsafety.com/offices***.

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