




WHITE PAPER

Flame Detection Solutions - Meeting the Needs of Each Environment

 The focus of this white paper is the importance of flame detection in the heavy industry. It will explore the variety of reasons why flame detection technology is of paramount importance to ensure the safety of those working within environments in which fire is, or could be, present.

There is a need for flame detection in a variety of industries, including the oil and gas, chemical, petrochemical and waste management sectors, in which the risk of fire is widespread. Alongside understanding why flame detection is required, it is important to understand what the process of flame detection involves and how businesses in the sector can choose the correct technology for their environment that will safeguard the property, finances and people within it.

What is Flame Detection?

Flame detection technology utilises specific sensors to detect and respond to the presence of flames, in order to alert those in the area and ultimately ensure their safety.

For gas to ignite, and cause a fire there has to be an ignition source, this is usually a spark (flame or hot surface) and oxygen. The concentration of gas or vapour in air has to be at a specific level in order for the 'fuel' and oxygen to react chemically and cause the ignition. The power of the explosion then depends on the 'fuel' and its concentration in the atmosphere. The relationship between fuel/air/ignition can be illustrated via a 'fire triangle'.



This 'fire triangle' concept has been used for many years and is a helpful tool to illustrate the necessary elements which give way to fires. Further research into the causes of fires has shown the need for a fourth component to be added. This fourth element is a chemical chain reaction.

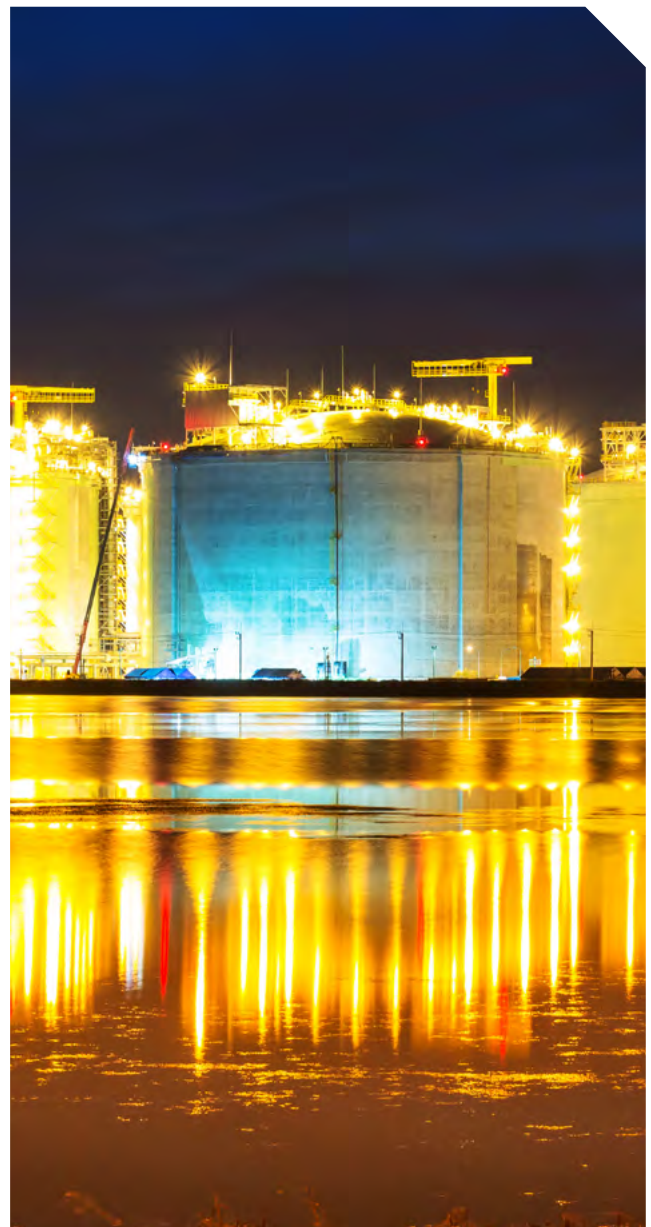
A chemical chain reaction will provide adequate heat to the fire to keep it burning and as long as the chemical chain reaction is sustained the fire will continue to grow.

With most types of fire the original fire triangle model works well – as removing one element of the triangle (fuel, oxygen or ignition source) will prevent a fire from occurring. However, when the fire involves burning metals like lithium or magnesium, using water to extinguish the fire could result in it getting hotter or even exploding. This is because such metals can react with water in an exothermic chain reaction to produce flammable hydrogen.



Not all concentrations of flammable gas or vapour in air will burn or explode. The Lower Explosive Limit (LEL) is the lowest concentration of 'fuel' in air which will burn and for most flammable gases it is less than 5% by volume. So there is a high risk of explosion even when relatively small concentrations of gas or vapour escape into the atmosphere. These LEL levels are defined, and can be explored further, in the following standards ISO10156, and IEC60079.

'Original' ISO standard lists LELs obtained when the gas is in a static state. LELs listed in the EN and IEC standards were obtained with a stirred gas mixture; this resulted in lower LEL's in some cases (i.e. some gases proved to be more volatile when in motion).



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Why is Flame Detection a Priority?

Without suitable and reliable flame detection technology in place, industries where multiple combustible or flammable substances are present, such as large facilities that may be sparsely manned or unmanned, are further at risk from damage to property and harm to human life. Large facilities specifically are even more in need of remote detection because of the size of these facilities.

Flame detection sensors that are not accurate can lead to increased false alarms, which leads to wasted time and effort spent responding to them. False alarms interrupt daily operations and halt the flow of the important work being undertaken. False alarms tend to be the response of non-flame radiation sources that fall within the field of view, these can be natural or man-made. These span solar-blind UV, window contaminants, non-modulated IR and modulated IR sources.

Avoiding this unwanted interruption is imperative and matching the technology with the application and hazard is a key way to ensure the chosen flame detection system works within its environment.

Health and safety managers must understand the type of fire to be detected, the environmental conditions surrounding the installation and the required performance in order to ensure the detection technology they choose avoids costly and time-consuming negative impacts.

The risks incurred by not having the right flame detection solution could lead to less than optimal protection from the dangers a potential fire would cause and increased risk to employees. Of course, a fire going undetected not only will have a significant negative impact on the staff within the environment, leading potentially to loss of life, it will also involve property loss and the loss of future income.



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Utilising sophisticated software analysis Crowcon's service delivers a performance based detection review.

Meeting Industry Needs - Choosing the Right Product

The cost of flame detection also matters, as those with a higher operating cost will directly impact the company financially. This financial impact, and the affordability of the solution chosen is something to bear in mind when choosing the technology that works best for your business.

A recent development in flame detection is IR3 technology, delivering greater detection distances and increased immunity to false alarms.

Crowcon provides a flame detection solution which meets all the key needs of each environment by ensuring speed and accuracy of detection and the accuracy, alongside a lower operating cost and large coverage.

Crowcon's Fgard IR3 flame detector is timely, reliable and cost effective and fulfils many of the requirements of the heavy industry when it comes to flame detection. The Fgard IR3 ensures a less than five second detection time, detecting a 0.1m² fire at a distance of 60m. The heated optics and advanced optical verification capacity also leads to less faults and significant reduction in operational expenditure. The Fgard IR3 is the only multi-spectrum IR flame detector without an external reflector, which often become contaminated and lead to more false alarms. Detectors with external reflectors often require much greater operational expenditure due to the need to repair or replace the reflector. The Fgard IR3 also features an advanced optical verification test (OVT) which initiates every 15 minutes verify circuitry (including IR sensors) and window cleanliness. The detector comes with a five year warranty and its heated optics prevent a loss of detection in challenging environmental conditions.

Crowcon's Hazard Detection Review Service offers the opportunity for businesses to gain a detailed report based upon 3D site images that identify gas and flame hazards and recommends detector quantities and location in line with British Standard BS 60080:2020.

Crowcon's hazard detection review service can help to ensure optimal coverage of your site and moves away from the traditional approach of relying upon site evaluation by engineers. Defining ideal location, type and quantity of gas and flame detectors can be difficult within industrial applications. This is due to the complex and varying nature of gases within the environment and the hazards they present.

Utilising sophisticated software analysis Crowcon's service delivers a performance based detection review that will show the best coverage, quantity, type and location of detectors required to achieve a safe system. Thanks to an auditable paper trail which details the hazard detection design, organisations remain compliance-ready, as well as being able to submit the review to Insurance companies and the Health and Safety Executive to demonstrate a safe design.



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We have technology at our disposal that can do more than provide basic provisions and preventative measures.

Conclusion

Implementing an effective flame detection service, or sensor system, is the ideal way to improve the speed and accuracy of detection and thereby reduce false alarms. It is also the way to lower operating costs and large coverage, as well as most importantly avoid the impact fires and explosions have on property and human life.

For more information about fire detection, choosing the appropriate system for your business, [get in touch](#) with a member of Crowcon's friendly team today.

