

## Siting Gas Detectors

Gas detectors usually fall into three specific groups for placement

**Plant Protection** - Typically flammable gas detectors fall into this category. Aside from asphyxiation flammable gases are typically not directly toxic and so detectors are placed strategically where the gas is expected to accumulate based on its relative density to air (lighter or heavier).

**Process Monitoring** - Typically gas detection systems in this section are used to monitor and either alarm or be part of processing control. This could be monitoring VOC (Volatile Organic Compounds) levels pre and post filtering, Solvent Vapour (LEL) monitoring in drying ovens, Ventilation control in car parks and building etc. Location of these detectors will usually be based on the individual application, after considering the process, gases or vapours, air movement and temperatures involved. Applications falling into this category usually need a good dialogue between IGD and the plant designers to ensure the best placement of the detectors for them to be highly effective.

**Life Safety Systems** - In such systems, the concern is that an asphyxiant or toxic gas is directly hazardous to personnel. The position of the gas detectors is based on the normal operating zone for people in the area of application. It is worth noting at this point that there maybe two sets of detectors involved with a life safety systems. The first set of detectors perform as a process monitoring function, with the detection based on the relative density of the gas with respect to the air. This set of detectors is typically used to person some type of function, for example: bringing extra ventilation to clear a spill hazard.

The second set of detectors are in the 'life safety zone' and alarm for personnel protection. When planning the system, careful consideration needs to be given to the actual setting of alarm levels for the detectors. In general HSE document Eh40 lists hazardous gases, vapours and safe occupational exposure limits. IGD base our alarm recommendations on the published figures provided by Eh40. Where a detector is fitted into the breathing zone for a gas, which is much heavier than air, then the alarm is set at a lower level to offset the effect of the higher location.

A typical example would be a Liquid Nitrogen Dewar fill room. In this application we know that spills will occur as Liquid Nitrogen is decanted. In this application the Lower-Level Oxygen detectors bring on extra ventilation at ground level to clear the Nitrogen spill as it evaporates into the atmosphere. If the ventilation cannot effectively clear the spill, then the detectors in the breathing zone are used to alarm and evacuate personnel in the area, until such a time that the atmosphere returns to normal safe levels.

Please see *Image 1: Placement of Gas Detectors and Zones* and *Image 2 Example of CO2 Gas Bottle Leak*



# Siting Gas Detectors



Consider ceiling divisions, follow rules for smoke detectors

Lighter than air gases, detectors placed at highest ceiling points  
Consider fitting collector cones at lower level for gas bottle stores  
boiler plant and gas meters (see separate application note).

**Methane, Helium, Hydrogen, Ammonia etc**

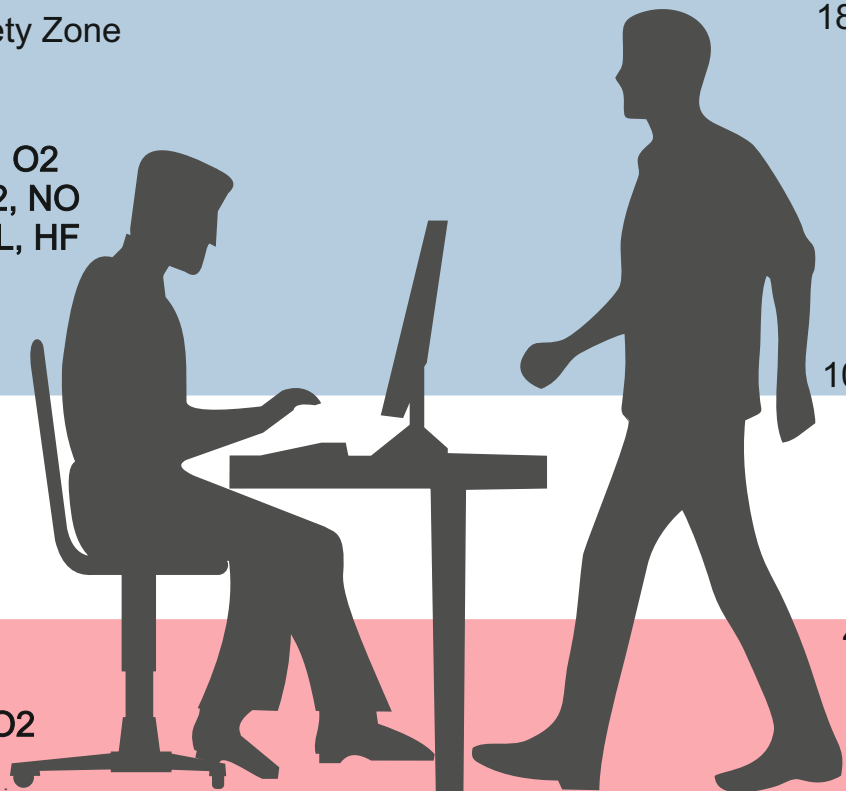
Life Safety Zone



CO, CO<sub>2</sub>, O<sub>2</sub>  
H<sub>2</sub>S, NO<sub>2</sub>, NO  
HCN, HCL, HF  
Nh<sub>3</sub> etc

1800mm

1000mm



LPG, CO<sub>2</sub>

400mm

Consider fitting splash/dust guards to protect low level sensors

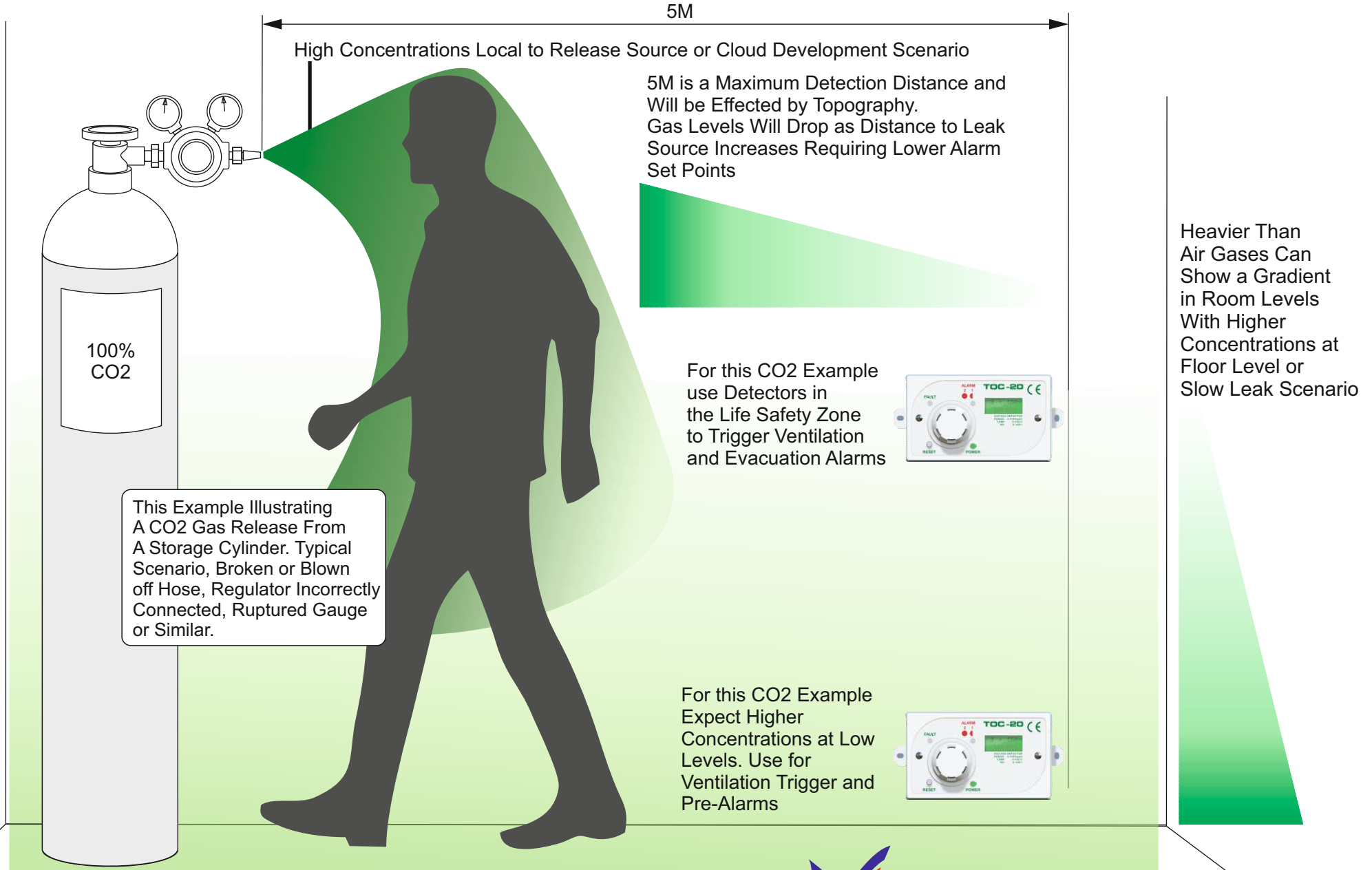
Consider sensors in under floor areas/voids/drains where heavier than air gases are present

**Image 1: Placement of Gas Detectors and Zones**



# Siting Gas Detectors

# Image 2: Example of CO2 Gas Bottle Leak



**International Gas Detectors Ltd**  
Innovative Gas Detection Since 1917

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T: +44 (0)161 483 1415  
E: [sales@internationalgasdetectors.com](mailto:sales@internationalgasdetectors.com)  
W: [www.internationalgasdetectors.com](http://www.internationalgasdetectors.com)



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### Specialised Sampling Gas Detectors

As well as manufacturing diffusion based fixed gas detectors, IGD also produce a range of sampling gas detectors. These are utilised where it may be difficult or impractical to use a standard gas detector. Typical applications could be: hard to access areas due to height, accessibility or detector size; clean rooms ; where it is desirable to minimise surface areas inside the facility. IGD's sampling gas detectors are addressable modules that can be fitted alongside standard diffusion type detectors. These sample modules operate continuously using IGD's piezo pump technology. This technology has virtually no moving parts for enhanced reliability over standard pumps. In addition, the units can be set up to continuously check and correct their zero or calibration point (depending on detector) by drawing a clean filter air sample through a separate port. A diffusion based detector directly in the area of interest is always the best option, where it is required IGD's sampler modules offer an excellent alternative solution.



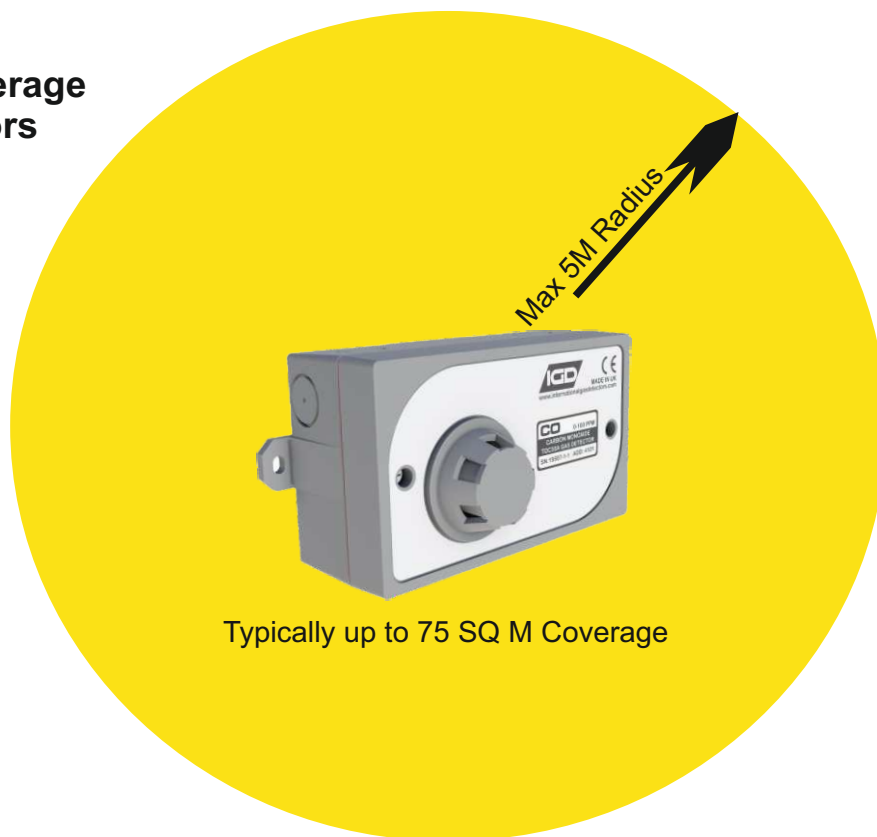
## Cryogenic Gas Detection

Careful consideration is required for gas detection for applications involving the use of cryogenically cooled gases such as Liquid Helium or Nitrogen. On initial release, cryogenically cooled gases can typically have a lower temperature and higher density compared to their surroundings and therefore, they will have a different behaviour than their gaseous state. In this instance it should be considered for two sets of detection for optimal safety, one for low level detection in the gases cooled state and one for the life safety zone. It is recommended to survey applications involving such gases.

## Area Coverage for Gas Detectors

In a similar manner to smoke detectors, a gas detector can provide up to 75SQ M area coverage based on a 5M radius of operation. There are many factors affecting this, geometry of a room, equipment in the area, gas characteristics, ventilation air flows etc. IGD can support throughout the survey, design and installation process to ensure the best possible result on site.

**Image 3: Area Coverage of IGD Gas Detectors**



## Calibration and service Requirements for Gas Detection Systems

All gas detection systems require regular checking and calibration to be in compliance with the UK factories act. The service and calibration period will be a function of the application based on environmental in service conditions. It is extremely important to ensure a service plan is in place for any gas detection system installed as part of a site safety system. IGD can work with operators to provide advice, service and spares to ensure an appropriate level of cover.



## Calibration and service Requirements for Gas Detection Systems

Regular checking and calibration in compliance with the UK Factories Act 1961 and BS EN 60079-29-2:2007 (in the near future Toxic Gas Detection will have a legal requirement to be serviced on a regular basis) is required for all gas detection systems. The service and calibration period will be a function of the application based on environmental in-service conditions. Both IGD and BS EN 60079-29-2:2007 legislation states that gas detection systems must be serviced every 6 months. Furthermore, the PUWER 1998 (provision & Use of Work Equipment Regulation) states "safety equipment needs to be effective and maintained". With these Acts/Articles in mind, it is essential to ensure that a service plan is in place for any gas detection system deployed as part of a site safety system. IGD can work with operators to offer advice, service and spares to ensure an appropriate level of cover.

**Service Engineer Competency:** IGD run an approved engineer training scheme and strongly recommends that only IGD certified engineers who have passed the *IGD Engineer Training Scheme*, should service and calibrate IGD equipment. IGD offer 12-month or 24-month service contracts (2 service visits a year). IGD certified engineers will carry the below emblem (Image 4: *IGD Approved Service Engineer Emblem*) with a unique number, please consult IGD for proof of competency.



**Image 4: IGD Approved Service Engineer Emblem**

**XXXXX**





## Control Panels:

Control Panels should be positioned outside of the hazardous area, protected by their connected gas detectors. They should be accessible such that when an alarm is triggered, it should be possible to evacuate the area and view the gas levels from the safety of the controller.

Consider the application of HMI panels, mimic panels or GSM options supplied by IGD to provide additional remote indication/alarm, through email and text notifications.



## Audio-Visual alarms

As a general rule if there is gas detection fitted to an area then there should be an audio-visual alarm (beacon sounder) to alert personnel who may be in the same area. Typically these will be standard beacon sounders where the sounder can be silenced from the control panel once an alarm is accepted. Standard LED beacon sounder modules are available from IGD and can be run from addressable I/O points to minimise cabling. Another option is to fit IGD's range of annunciators.



## Annunciators

Annunciators are addressable devices typically fitted at door entry points. In the event of a gas alarm, a clear audible visual alarm is provided by the annunciator to warn people from entering an area where a gas hazard could be present.

Annunciators are advantageous in many ways when compared to the standard beacon sounder. They can be installed on standard dado trunking systems; cannot be confused with other alarms, can be fitted with slam switches and displayed alarm message and flashing colour display are unambiguous



# Siting System Components

## Gas Collector Cones and splash Guards

Gas Collector cones can be considered for use in areas where detectors are placed above gas plant such as boilers or meters in rooms with high ceilings. They are fitted to detectors located just above gas plant to enhance the capability of detectors to sense gas leaks



IGD Detector fitted with a Gas Collector Cone

For detectors at low level, fitting splash guards may be appropriate to protect sensors from floor washing, rain splash dust ect.



ATEX/IECEX Detector fitted with an IGD splash guard

