Planning and Designing Gas Detection - Technical Engineering References for Instrument and Fire & Gas Design Engineers

The following Planning and Designing Gas Detector references are from sources which provide what ICEweb considers to be the best technical and educational information on the subject. We always acknowledge the author and source. Should there be any issue with ICEweb providing this information, please contact us and we will remove it immediately. We also welcome non-commercial technical documents (subject to editorial review) and post them free. - ICEweb is a Free Technical Information Website for Instrument, Control, Fire & Gas and SIS Engineers and the sponsorships provide the funding to cover running costs.

*The Planning and Designing of Gas Detection Systems should only be undertaken by Competent and Experienced Instrument or Fire and Gas Engineers. ICEweb’s Planning and Designing of Gas Detection Systems – for Instrument and Fire & Gas Engineers page gives some useful technical advice on this.*

Further Excellent Planning and Designing Gas Detection -Technical Engineering References from around the world follow;

**How to Manage Hazardous Areas Effectively by using Gas Monitors** - Electrical equipment installed in hazardous areas, necessarily has to conform to the area classification for that area. However, frequently, practical problems arise, where the specified equipment may not be easily available. For example, an area classified as Zone 1 under the IEC system, theoretically can accept only Zone 1 equipment. However sometimes, especially in case of specialized equipment, Zone 1 certified equipment of that type may not be available. In such cases what could be done? This paper presents the background of such situations, possible solutions and current international practices regarding this issue - from Abhisam Software.

**Planning and Designing Gas Detection Systems** - This paper has a wealth of questions, answers, positioning tips etc, from the ISA and InTech it is well worth a read.

**Performance Based Gas Detection System Design for Hydrocarbon Storage Tank Systems** - Srinivasan N. Ganesan and Edward M. Marszal - The design of hydrocarbon gas detection systems using risk analysis methods is drawing a lot of attention because industry experts have come to a consensus that design codes used in traditional gas detection system design work are not sufficient for open door process areas having serious hazards, such as fire, flammable gas and toxic gas. The ISA Technical Report TR 84.00.07 provides guidelines for the design of fire and gas systems in unenclosed process areas in accordance with the principles given in IEC 61511 standards. This paper presents an overview of the design of gas detection systems using risk assessment methods that are described in the ISA technical report. These methods are statistical in nature and are used to assign and verify targets for the
performance metrics (detector coverage and safety availability) of gas detection systems. This paper also provides an overview of the performance based safety life cycle of gas detection systems from conceptual design stage to operations and maintenance - from isssource.com.

**Gas Detection Reference Guide** - This comprehensive design guide from Scott Safety covers;
- Sensor technology including; Catalytic Bead Sensors, Infrared Sensors, Electrochemical Sensors, Photo Ionization Detector, Metal Oxide Semiconductor Sensors, Sensor Performance Factors and Flame Detection.
- Glossary of gas detection terms

**4-20mA Transmitter Wiring** - Transmitters are available with a wide variety of signal outputs. The 4-20mA analogue signal is by far the most commonly used in industrial applications. Several physical 4-20mA wiring options exist. This guidance note aims to outline these options.

**Planning of Gas Detection Systems** - This brochure is a guide for the planner and installer of gas detection systems. Whilst it is written around Polytron gas detection systems it gives a number of answers for recurring questions emerging during the installation of typical systems - from Draeger Australia

**Planning and Designing Gas Detection Systems** - With a grasp of gas sensor basics, and a methodical plan for installing the detectors, you can build a system smart enough to save your life - Wolfgang Jessel - from Draeger Australia.

**Positioning of Sensors Guidelines** - The problem for gas detection systems in general, for 95% of installations there are no precise guidelines, either national or international, that could be followed to determine the number, spacing and positioning of gas detectors for a given industrial installation. This paper addresses this issue - from Draeger Australia.

**Selecting and Placing Gas Detectors for Maximum Application Protection** - Dave Opheim - Many industrial processes involve dangerous gases and vapors: flammable, toxic, or both. With the different sensing technologies available, and the wide range of industrial applications that exist, selecting the best sensor and locating them properly for the job at hand can be a challenge - from Detector Electronics Corporation.

**Sensor Selection Guide** - Each of the following sensor, electrochemical, catalytic bead, solid state, infrared and photoionization detectors must meet certain criteria to be practical for use in area air quality and safety applications - from International Sensor Technology.

**The Detection of Hazardous Gases** - The detection of hazardous gases has always been a complex subject and makes choosing an appropriate gas monitoring instrument a difficult task. This chapter provides a simple guide to the various sensor technologies available and Terms Definitions and Abbreviations - from International Sensor Technology.
12.13 The Selection and Use of Flammable Gas Detectors - This guidance has been produced by the UK Health and Safety Executive. It provides advice and information on the selection, installation, use and maintenance of industrial flammable gas detectors.

12.13 Location of Fixed Gas Detectors and Relevant Standards - There are no specific standards governing gas detector location (unlike fire detection systems); there are however general guidance documents. Two examples which give information on locating detectors and also selection of sensor technologies are: BS EN 50073:1999: Guide for selection, installation, use and maintenance of apparatus for the detection and measurement of combustible gases or oxygen and IEC60079-29-2 Ed1.0: Explosive atmospheres - Part 29-2: Gas detectors - Selection, installation, use and maintenance of detectors for flammable gases and oxygen – from Crowcon.

12.13 Key Concepts in Gas Detection - A Guide to Understanding Today’s Gas Detection Technology - Gas-detection systems are important front-line watch dogs, and provide many process plants with early notification of dangerous releases. Proper design and layout is critical to the functionality of these systems, but poses a challenge for many users since little standardized guidance is available. A qualified safety professional should be involved in all ultimate design decisions. When designing a gas-detection installation, the user must remember that gas detection is only one part of a facility’s comprehensive safety management plan. To be most useful during facility operation, monitoring system users should address not only how many sensors are required and where they will go, but also how the real-time data provided by these devices can be used to improve the overall safety of the plant and its workers – from Scott Health and Safety.

Performance-Based Gas Detection System Design for Hydrocarbon Storage Tank Systems - Srinivasan N. Ganesan, M.S., P.E. and Edward M. Marszal, PE - The design of hydrocarbon gas detection systems using risk analysis methods is drawing a lot of attention because industry experts have come to a consensus that design codes used in traditional gas detection system design work are not sufficient for open-door process areas having serious hazards, such as fire, flammable gas and toxic gas. The ISA Technical Report TR 84.00.07 provides guidelines for the design of fire and gas systems in unenclosed process areas in accordance with the principles given in IEC 61511 standards. This paper presents an overview of the design of gas detection systems using risk assessment methods that are described in the ISA technical report. These methods are statistical in nature and are used to assign and verify targets for the performance metrics (detector coverage and safety availability) of gas detection systems. This paper also provides an overview of the performance based safety life cycle of gas detection systems from conceptual design stage to operations and maintenance – from ISSSSource.

The following articles are from the Interscan Corporation
Gas Detection Knowledge Base - Many useful articles on Gas Detection here.
Useful Conversions for Gas detection - These are very handy.

Interfering Gases - No analytical method is completely specific. Gases present in the environment, other than the "target" gas of measurement, may affect instrument response. Interferences are not necessarily linear, and may also exhibit time dependent characteristics.

The following papers are from General Monitors


Diversified Technologies for Fixed Gas Detection - Edward Naranjo and Gregory A. Neethling - Over the years, a variety of gas detection technologies have been developed for the oil, gas, and chemical process industries. The advent of embedded electronics, sophisticated firmware, new materials, and spectral techniques has prompted remarkable improvements in detection. In many cases, technology development proceeds through parallel routes with each technology staking its own specialist market. Catalytic bead sensors and infrared detectors are two examples of conventional sensing methods with wide customer acceptance. Likewise, comparatively newer technologies like open path, gas cloud imaging, and ultrasonic gas leak detection have made inroads into the safety instrumentation market, not due to their novelty, but because they solve customers’ problems like no technology before them. In such a world of competing solutions, it is tempting to think single technologies will provide answers to most industry challenges. Offshore platforms, onshore terminals, gas compressor stations, and other facilities, however, are complex environments no single type of detector is bound to cover completely. Experience has shown it is in fact the combination of gas detection schemes that provide the enhanced level of safety that customers demand.

Hydrogen Detection in Oil Refineries - This white paper offers a practical approach for the deployment of fire and gas detectors that maximizes detection efficiency. The approach is based on the notion that any one detection technique cannot respond to all hazardous events and consequently, the risk of detection failure is reduced by deploying devices that have different strengths and limitations.

Combustible Gas Safety Monitoring: Infrared vs. Catalytic Gas Detectors - When designing a combustible gas safety monitoring system for oil/gas, petrochemical or other applications, how do you decide whether to use infrared or catalytic gas detector technology? Both sensing technologies have their advantages dependent upon your application’s specific requirements. A thorough analysis of your application’s unique field environment is needed to ensure optimal performance, safety, reliability and cost-effectiveness. A quick decision, of course, can lead to poor detector choices as well as safety, performance, maintenance, and life-cycle cost consequences.