



Ultrasonic Gas Leak Detection

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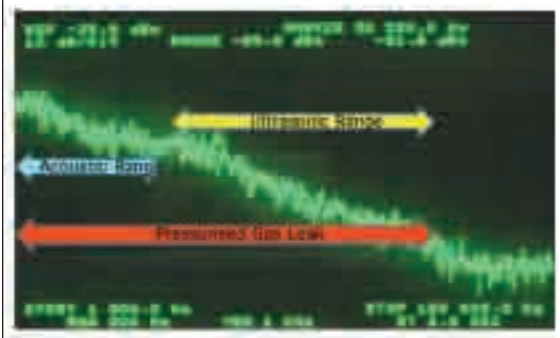
Over the past several years there has been a quiet revolution in the art of gas detection with the steady introduction of a new technology to complement the existing methods of detecting gases. Conventional flammable gas detectors, either catalytic point, Infra red point or Infra red beam, all rely on two actions before they trip in to alarm, firstly, the gas leak cloud needs to actually reach and encompass the sensor or pass through the beam, secondly the gas concentration of the cloud has to reach the alarm set point level.

Ultrasonic detectors are designed to detect the 'sound' a gas leak makes when it escapes from high pressure (such as a pipeline or vessel) to vent to atmosphere, and, therefore, do not need to be within the gas cloud, in fact the ultrasonic detector can be up to 20m from the leak source. If a leak is detected, it can trigger either an instantaneous or time-delayed alarm.

Methodology

A pressurised gas leak has a noise wave which encompasses acoustic frequencies (normal hearing in the range 16 Hz to 18 kHz) through to the ultrasonic range (20 kHz to 200 kHz).

Relative Spectral Range



Using a purpose designed ceramic encased piezo sensor which is non-responsive to acoustic sound levels, the new generation of detectors are able to respond only to ultrasonic wavebands.

All industrial environments have background noise, most of which is in the acoustic range, however, motor based equipment, such as generators, can have an ultrasound signature, especially when bearings are starting to wear.

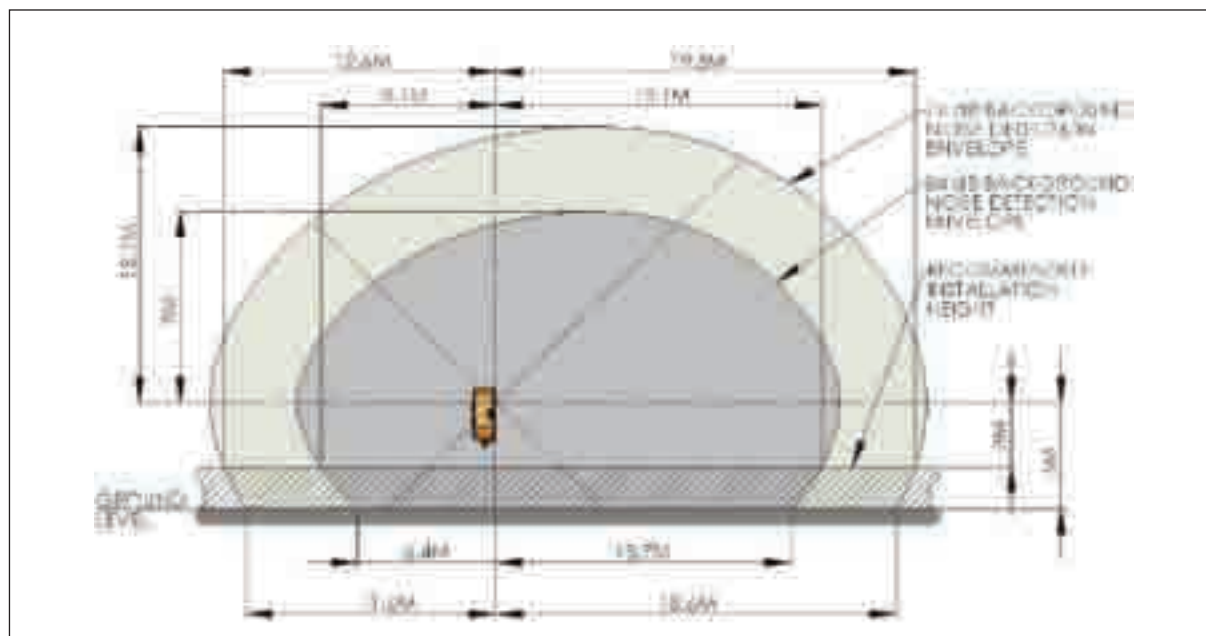
Mapping

To establish the background noise level at any major site it is always recommended a mapping survey be carried out, which has two main benefits.

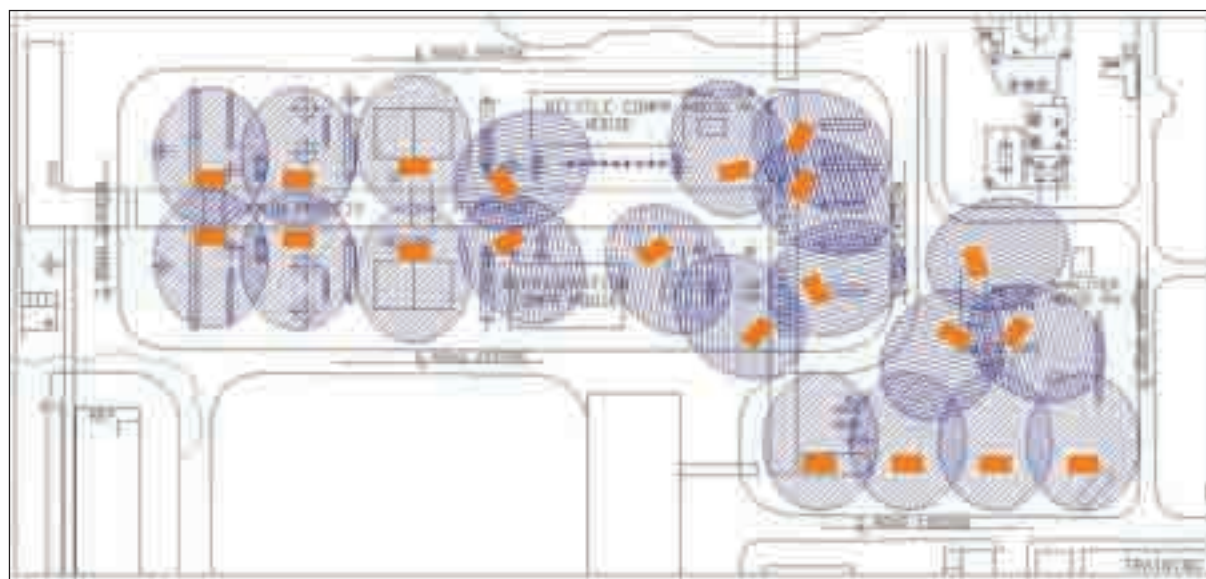
Establishing the background noise allows an alarm level to be recommended which would eliminate spurious alarms. Modern ultrasonic detectors are equipped with intelligence which monitors ambient noise levels and sets alarm levels accordingly and can even differentiate between 'day' and 'night' plant operations.

A mapping survey enables an accurate plant picture to be built up allowing optimisation of the numbers of detectors required and ensuring there is full coverage on any plant. Currently, ultrasonic mapping is the only system which can simulate potential gas leaks under site conditions.

In addition to ultrasonic sensor manufacturers, a growing number of organisations are able to offer this mapping service.



Typical Coverage with a CH₄ leak of 0.1kgs/sec



Mapping Survey indicating 21 sensors required on an Onshore Gas receiving Terminal

Conclusion

Ultrasonic detectors as an initial tier in a gas detection system would increase risk reduction.

- 1st Tier – Ultrasonic gas leak detectors:
 - o Detect an initial gas leak
- 2nd Tier – Point detectors (catalytic, Infra Red, electrochemical):
 - o Identifies and quantifies the gas leak
- 3rd Tier – Area protection (line of sight):
 - o Registers the spread and coverage of the gas leak

Applications

Offshore Platforms, Onshore Terminals, Chemical Plants, Refineries, Gas Compressor and pipeline metering stations, FPSO's (Floating Production, Storage and Offloading vessels, Sites where gas is under pressure (minimum pressure 2 BarA)



Groveley GDU INCUS
Ultrasonic Gas Leak Detector