

Introduction

The measurement of flammables is a must-have feature for any personal multi-gas detector. Most common flammables found in (chemical) industries are hydrocarbon compounds, such as Methane, Propane etc.

Flammable compounds are measured by a LEL sensor. The WatchGas QGM has two LEL sensor options: catalytic (CAT) or infrared (IR). The robust catalytic LEL sensor is inexpensive, making the QGM available for a competitive price. The infrared LEL sensor uses very little energy, making the QGM run up to 2 months on a single battery charge.

This report will investigate the QGM's response to different hydrocarbon components and looks at the differences between catalytic and infrared.

Method

The Watchgas QGM device was calibrated using 2.2 vol% (50%LEL) Methane (CH₄). Methane, Propane, n-Butane, i-Butane, n-Pentane, n-Hexane, respectively, was obtained in cylinders containing 50 %LEL for each component. Subsequently, each gas was applied to the QGM device. Three devices were used for each sensor type, catalytic or infrared.

Results

Catalytic LEL sensor

The WatchGas QGM with a catalytic LEL sensors responded to any of the applied hydrocarbons, as shown in table 1.

QGM CATALYTIC			
Hydrocarbon	Formula	QGM reading	CF
Methane	CH ₄	50,0	1,0
Propane	C ₃ H ₈	29,3	1,7
n-Butane	C ₄ H ₁₀	34,7	1,4
i-Butane	C ₄ H ₁₀	31,0	1,6
n-Pentane	C ₅ H ₁₂	25,0	2,0
n-Hexane	C ₆ H ₁₄	20,0	2,5

Table 1: WatchGas QGM-CAT response to hydrocarbons

It is clearly seen that the WatchGas QGM will detect all tested hydrocarbon components. As these get heavier, the response relative to methane decreases.

Infrared LEL sensor

The WatchGas QGM with an infrared LEL sensor did also respond to all tested hydrocarbon components, as shown in the table below.

QGM INFRARED			
Hydrocarbon	Formula	QGM reading	CF1
Methane	CH ₄	50,0	1,0
Propane	C ₃ H ₈	81,7	0,6
n-Butane	C ₄ H ₁₀	79,3	0,6
i-Butane	C ₄ H ₁₀	78,3	0,6
n-Pentane	C ₅ H ₁₂	32,7	1,5
n-Hexane	C ₆ H ₁₄	19,0	2,6

Table 2: WatchGas QGM-IR response to hydrocarbons

It was observed that the difference between each tested infrared sensor was greater than the difference between each catalytic sensor. This is due to the fact that these infrared sensors are linearized for Methane only. The response to other hydrocarbons is non-linear, and different for each individual sensor.

Conclusion

It can be concluded that the WatchGas QGM with a catalytic or infrared LEL sensor does show a good alarm response to Methane, Propane, n-Butane, i-Butane, n-Pentane and n-Hexane. All 50 %LEL concentrations for all hydrocarbons did result in an alarm response from the device.

Calibration

To ensure maximum accuracy, it is best to calibrate the LEL sensor with the gas is most likely to be measured. So, if a QGM will be used to ensure worker safety in a chemical plant producing propane, its LEL sensor should be calibrated using propane gas. When the LEL sensor is calibrated with the target gas, a correction factor does not have to be used.

Please contact a WatchGas service centre for more information.