



Considerations to be taken into account for VOC vapor monitoring





With volatile organic compounds (VOC) vapors you reach the toxic exposure limit long before you reach the LEL alarm

The use of catalytic (CC, catalytic combustion) LEL sensors to measure combustible gas works well for most portable and stationary gas detection applications. However, the situation can be affected by the type of gas being measured. Catalytic LEL sensors can be used to detect gases like methane, propane, and pentane; and they can be used to detect gasoline vapor, but are not recommended for middle distillates like diesel or kerosene.

The first challenge is the size of the molecules. The larger the molecule, the lower the relative response, and the longer it takes for the sensor to reach its final stable reading. Kerosene and diesel vapor molecules are comparatively large, and the response of CC LEL sensors to these molecules is comparatively weak. The second reason is that the occupational exposure limits (OELs) for these toxic VOC vapors are very low. For example, while the TLV[®] for gasoline vapor is 300 ppm, the TLV[®] for kerosene is only 30 ppm, and the TLV[®] for diesel is only 15 ppm. Even with a perfectly functional percent LEL sensor, you reach the toxic exposure limit long before you reach the LEL alarm.

Use a PID sensor to avoid exceeding the toxic exposure limit ...

The 100 % LEL concentration for kerosene is 0.7 % volume, which corresponds to 7000 ppm. That means 10 % LEL kerosene still is 700 ppm. If one uses a catalytic LEL sensor, and sets the alarm at 10 % LEL, even if the sensor responds perfectly for kerosene, it would take a concentration over 23 times higher than the exposure limit to activate the alarm.

For this reason, GfG recommends a PID sensor to measure kerosene and gasoline vapor with portable devices, like the G460 or the G999P, which allows setting the alarm at the ppm toxic exposure limit.

One should still have means of monitoring LEL installed in the instrument as well, but action should be taken at the toxic limit concentration.

... and use CC or IR sensors to monitor LEL.

Photo-ionization detector (PID) sensors work very well together with CC LEL sensors. PID sensors are designed for ppm range detection of toxic VOC vapors. They are not designed to provide LEL range measurement, and they cannot be used to measure common LEL gases like methane, hydrogen, and natural gas. On the other hand, CC LEL sensors are specifically designed to measure these flammable gas vapors. CC LEL sensors can be used to measure the LEL concentration of many VOC vapors as well, but make sure the sensor is set up and calibrated for the vapors of interest. When the CC LEL sensor is used to measure vapors from VOCs such as ethanol, toluene, or middle distillates, make sure the sensor is calibrated for the gas of interest, and that it is not equipped with a protective filter used to remove silicone vapors. The filter protects the sensor from poisons and inhibitors, but it also slows the response. When you install a CC LEL sensor in the G460, the library of correction factors in the instrument depends on whether the sensor is equipped with the filter. The unfiltered sensor allows for a wider range of gases to be detected and provides faster response time compared to the filtered version.

Another approach is to use an infrared (IR) LEL sensor to measure explosive range concentration gasoline and kerosene. The IR LEL sensor responds better than the CC LEL sensor to the large molecules in these vapors. However, you still have the issue of taking action at the TLV rather than taking action at 10 % LEL. Once again, the PID sensor pairs very well either the IR LEL sensors in the G460 and G999. Also, since IR LEL sensors cannot detect hydrogen, GfG normally includes an electrochemical hydrogen sensor in any portable instrument that includes an IR LEL sensor.

In this way, a multi-gas monitor continues to fulfill its function when employees enter contaminated areas wearing respirators or protective suits, for example.



The G460 and G999P portable gas detectors have a PID sensor.

GfG is always happy to answer any questions you may have about our portable gas detectors or fixed gas detection systems.

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