



Did You Know About the Different Sensors Used to Monitor for Ammonia?

Ammonia (NH₃) is a common gas found in some industries today, particularly in the Food Processing industry where there is use of refrigeration to keep the product cold or frozen. Ammonia is a relatively new form of refrigerant that is coming into widespread use to replace the previously used chlorinated and fluorinated refrigerants that cause depletion of the earth's ozone. Besides food processing, some other places where large concentrations of ammonia gas can be found are chemical plants, fertilizer plants, water treatment plants, and wastewater treatment facilities. In order to keep personnel safe, these industries need to monitor the ammonia levels in their facilities. Ammonia is dangerous—it attacks the respiratory system and at a level of 5,000ppm (parts per million), it will cause death. Therefore, the NIOSH exposure limits are relatively low:

- TWA (Time Weighted Average): 25ppm
- STEL (Short Term Exposure Limit): 35ppm
- IDLH (Immediately Dangerous to Life & Health): 300ppm
- LEL (Lower Explosive Limit): 15% or 150,000ppm

Being able to determine the levels of ammonia present, helps a Safety Manager know what PPE (personal protective equipment) to have their employees use, and/or other courses of action.

1. Respirator with ammonia cartridges if levels over 35ppm for 15 minutes (STEL)
2. Positive pressure supplied air or SCBA if levels of 250-300ppm
3. Level A suit if levels of 250 – 5000ppm
4. Evacuate the area if over LEL of ammonia, potential for explosion

That brings us to the different sensors that can be used in direct-read gas detectors to monitor for ammonia. These sensors can be ordered alone as a single gas detector, or in some cases, combined to be used in a multi-sensor gas detector unit.

An electrochemical ammonia sensor displays as NH₃ on the display screen of a gas detector. These sensors are ammonia specific only, and usually measure in the 0-100ppm range. These sensors are always calibrated with ammonia calibration gas.

A PID (Photoionization detector) sensor can detect ppm in ranges at a minimum ceiling of 1,000ppm, depending on the manufacturer. A PID sensor will respond to a wide range of Volatile Organic Compounds (VOC's), so it is not ammonia specific. However, if the compound being detected is known to be ammonia due to the obvious circumstances, then the reading shown on the display can reliably be determined as ammonia.

A common catalytic bead sensor will measure for the LEL (Lower Explosive Limit). The LEL for ammonia is 15%. There is a potential for explosion if ammonia is at this level.

In addition to the sensors above, colorimetric ammonia gas detection tubes can also be used as another method of 'spot' checking ammonia levels. The test results from tubes can help validate readings from the high range PID sensor.

Sources: RaeSystems by Honeywell – Application Note AP-201

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