

Low Cost, Self Checking Carbon Monoxide Gas Detection System for Industrial Plants and Warehouses that Use Internal Combustion Forklift Trucks for Loading and Unloading Delivery Trucks

by Jim Seneczko

Problem:

Internal combustion engine forklift trucks and idling delivery trucks can produce deadly amounts of carbon monoxide in high truck traffic areas. Carbon monoxide gas can quickly accumulate in these areas and be a serious safety and health concern. This situation is common throughout the year, but especially dangerous in the winter months when doors and ventilation system dampers are kept closed. Within seconds, carbon monoxide gas levels can rise to more than 10 times the OSHA permissible exposure levels (PEL's) and within minutes be easily at or over immediately dangerous to life and health (IDLH) levels.

Background:

Carbon monoxide (CO) is a colorless, tasteless and odorless gas this is virtually impossible to detect by the human senses. Carbon monoxide is produced by incomplete combustion processes such as idling diesel truck engines, small gasoline powered engines and poorly tuned forklift propane and gasoline engines.

The toxic effects of low levels of CO include headaches, dizziness and nausea. At high levels (500 ppm and up), confusion, cyanosis, angina and asphyxiation can occur. Workers in these areas breath in carbon monoxide gas molecules which get transferred into the lungs. In the lungs the CO molecules take the place of oxygen molecules and bind themselves to red blood cells (hemoglobin). This binding is very strong and does not allow oxygen molecules to attach, thus oxygen cannot be sent into the body. Asphyxiation quickly takes place.

OSHA Limits:

The OSHA PEL level for CO is currently at 50 ppm. The PEL is an average gas concentration a worker can be exposed to for an eight hour work shift period and not suffer any short or long term health problems. OSHA has also established a 200 ppm CO gas ceiling. This level should never be exceeded even for short periods of time. Note: Poorly tuned forklift trucks can

produce CO gas in excess of 2,000 ppm.

Solution:

Since CO gas is impossible to detect with the human senses, a CO gas detection sensor system should be used. The Analytical Technologies, Inc. (ATI) GasSens CO gas detection system with Auto-Test feature is an excellent choice for this application. The GasSens system will detect the presence of CO gas down to as low as 1 ppm and high levels of more than 100 ppm. The system consists of two components: the first is a sensor transmitter that can be located in the area of concern, normally mounted on a wall near the truck area. This sensor transmitter detects the CO gas and sends a signal back to the second component, the receiver module. The receiver module has a digital display that continually shows the CO gas concentration. It also has a visual warning and alarm lights that control a series of relay contacts that can power strobe lights, warning beacons, exhaust fans or send warning signals back to a guard shack or command post. Typically the warning level is set to a low gas concentration (35-50 ppm) to indicate rising concentrations. At this warning level a relay can be energized to turn on an exhaust fan and clear the area of gas. If gas concentrations continue to increase the second alarm light can energize a second relay that can power a strobe light or send a signal to security so that an evacuation of the area can take place. Figure A shows the GasSens systems.

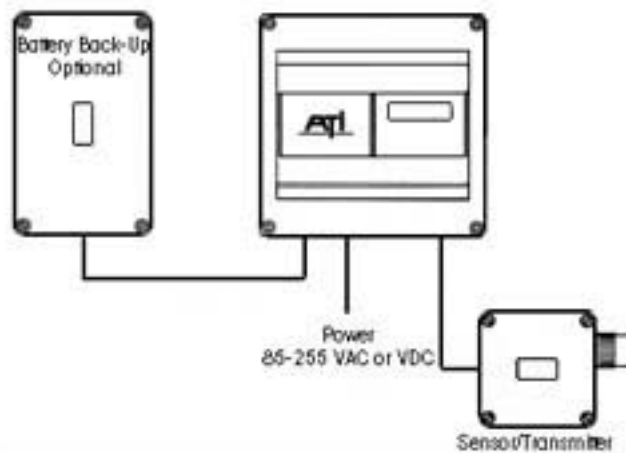


Figure A

Auto-Test Feature:

The GasSens CO gas system can be equipped with the optional Auto-Test feature that automatically tests the sensor. The Auto-Test system generates a test gas concentration at the tip of the sensor transmitter every 24 hours. If the system works properly, the system continues to work normally. If the sensor does not respond to the gas test a fault warning is displayed on the receiver and a new sensor or minor adjustment might be needed.



Figure B

Conclusion:

The use of the ATI GasSens gas detection system with the Auto-Test feature will continually alert workers, in high forklift truck traffic areas, of increasing levels of deadly CO gas. The GasSens system will provide 24 hour protection, monitor OSHA CO PEL's with minimal cost and maintenance time. This system will give workers and management peace of mind or knowing that everyday the CO gas detection system is being tested and is working properly.

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