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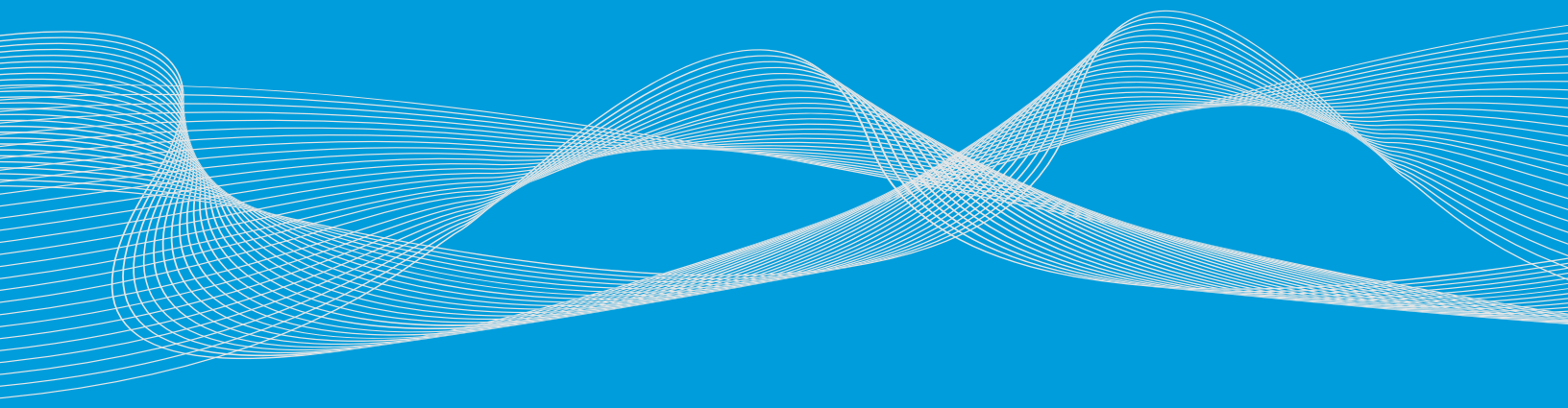
THE IMPORTANCE OF MAINTAINING YOUR TOXIC GAS MONITORING AND CONTROL SYSTEM



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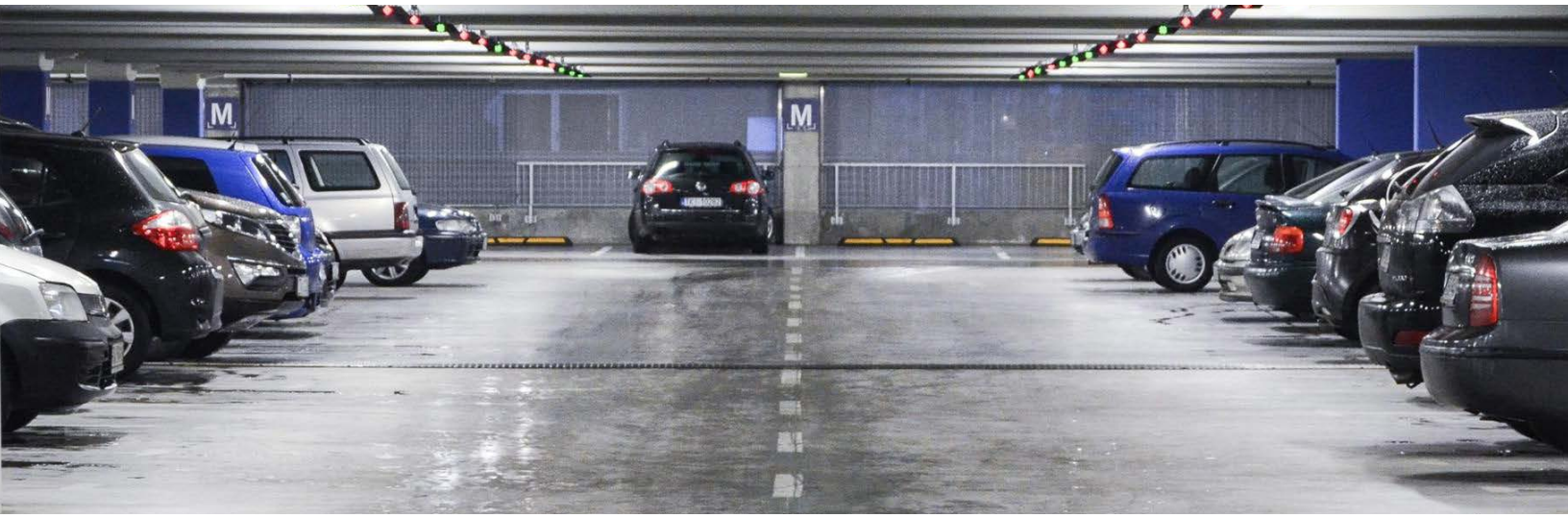
The Importance of Maintaining your Toxic Gas Monitoring and Control System

Carbon monoxide (CO) and nitrogen dioxide (NO_2) which are emitted from gasoline and diesel engines respectively, are toxic to humans. Both are odorless, colorless and tasteless. As with most substances, individuals vary greatly in their sensitivity and severity of reaction to exposure. Facility design engineers are acutely aware of the dangers that these gases pose and routinely determine if mitigation of the health risk is required and if it is, what that mitigation solution should be.

Parking garages, tunnels, vehicle maintenance facilities and other facilities where internal combustion engines are operated in a confined space all present a very real health risk if the toxic gas is allowed to collect. If the mechanical engineer of record has designed a facility with mechanical ventilation to remove the toxic gas, the question becomes: When should the fans be running?



"When should the fans be running?"

There are only four possible answers:

	Decision and Control Method	Safety Score	Energy Efficiency Score	Life-cycle Maintenance Considerations
1	**Assign the responsibility for turning the fans on and off to one or more people.** That person or those people would be responsible for the health and safety of all persons that enter the space. The uncertainty of their decisions would result in an entirely unreliable and dangerous control strategy.	Low	Low	a
2	**The fans can be operated 24 hours per day, 365 days per year.** This solution eliminates the decision making and absolutely eliminates the health risk as long as the fans remain operational.	**High**	Low	a
3	**The fans can be operated with a time clock.** Presuming that the times of day and days of week that operating vehicles will be present, time clocks could be used to turn the fans on and off according to that schedule. This is also a risky solution because there is no certainty that vehicles will never be present outside of the defined schedule.	Low	Low	a, b
4	**The fans can be operated in response to the accurate detection of significant levels of either toxic gas anywhere in the space**.	**High**	**High**	a, c

Life-cycle Maintenance Considerations

a. The fans (exhaust, supply and/or circulating) and related equipment (dampers, louvers, etc) must all be in proper working order.

b. The time clock must be in proper working order and set to the correct schedule.

c. The sensors must be measuring the gas levels correctly and the controller must be configured with the correct sequence of operation.

Because **Method 4** is the only method that delivers **high** safety and **high** energy efficiency, it is considered "**best practice**."

Think of Gas Sensors Like Tires

Toxic gas sensors have many similarities to tires on a car: they interact with their environment and they change in the course of normal use. For peak performance, tires need correct air pressure, balance and alignment. The maintenance interval on tires is typically a combination of miles driven and time since they were serviced last. Similarly, the rate at which the gas sensors change over time depends on the amount of gas that they are exposed to. Since this rate of change is impossible to predict, many manufacturers recommend annual service.

Although the sensors themselves can most likely perform to spec for longer than a year without service, regular service also is necessary to ensure that the controller's sequence of operation (control strategy) is still appropriate for the facility's actual use and that the mechanical equipment is both functional and in "automatic" mode allowing it to operate in response to the presence of the toxic gas.

During the annual service, it is recommended that calibration gas be presented to a representative number of the sensors. If the readings are still within the original tolerance, no further calibration or sensor replacement is required. If they are out of tolerance, field- or bench-calibration must be performed. In addition, when the test gas is presented to the sensor, the service technician must determine that the correct ventilation equipment is responding and that when the test gas is removed, that the ventilation equipment returns to its baseline state. A factory certified technician can perform this "bump testing" as well as any corrective action quickly and cost effectively.

Sensor-based ventilation controls are code-required in parking garages in most jurisdictions. If the system is properly designed and installation drawings are strictly followed, it will be easy to install and commission. If the programming files and drawings are properly archived, the system can be economically maintained for many years without any components needing replacement. Eventually, the gas sensing elements will wear out and need to be replaced. Carbon monoxide sensors typically last for six years or more. Nitrogen dioxide elements typically last for two years or more. “Best in Class” gas monitoring and control systems are designed such that the sensor elements can be easily replaced by minimally trained technicians without special tools.

Owning and/or operating a facility where motor vehicles operate in an enclose space carries risks. The risk of poisoning from exposure to toxic carbon monoxide or nitrogen dioxide gas is all but eliminated by the installation of a reliable sensor-based ventilation control system and maintaining it properly.

About The Author

Mike Adelman is the General Manager for IN*TEC* Controls in San Diego, Calif., a senior member of the Internal Society of Automation and a recognized speaker in the convention-circuit advocating for green parking sustainability.

IN*TEC* Controls is a premier, worldwide provider of gas detection solutions and other peripherals to the commercial HVAC Controls, Energy Management and Building Automation markets. As a product brand of Relevant Solutions, IN*TEC* Controls brings over a hundred years of combined, dedicated experiences in the HVAC/R industry to Building Solutions.

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