

## Monitoring and Control of CO Emissions in Parking Structures

BY ROB ALBINGER

**U**NTIL RECENT YEARS, most parking garage owners and managers did not realize the detrimental effects that carbon monoxide emissions from motor vehicles have on the air quality inside parking garages. With increasing awareness of indoor air quality, astute parking garage owners and managers place great importance on the reduction of CO in parking garages.

Ventilation systems are a must for today's parking facilities, especially in mixed-use or subterranean facilities. But it can be costly to operate fans 24/7. This explains why mechanical contractors and HVAC specialists are increasingly specifying CO monitoring and ventilation systems for both new and existing parking structures.

### The Health Effects of CO Exposure

Carbon monoxide, an odorless, tasteless and colorless gas, is the leading cause of accidental poisoning deaths in the United States. The Centers for Disease Control and Prevention estimates that CO poisoning claims nearly 500 lives and accounts for more than 15,000 visits to emergency rooms annually.

When not properly ventilated, CO concentration can build to toxic levels. Effects of CO poisoning include headache, nausea and fatigue, or at higher levels, confusion, staggering, heart palpitation, unconsciousness and death. Furthermore, when CO emissions fill a space, the oxygen in that space is depleted, causing asphyxiation.

A parking garage without adequate ventilation CO can easily exceed NIOSH and OSHA recommendations, putting workers, tenants and commuters at severe health and safety risks. This is why California and several other states have passed laws to limit CO levels in parking garages.

### CO Sensing Technologies

CO monitors utilize different types of sensors, and not all CO sensors are alike. Electrochemical sensing technology provides many advantages over the older semiconductor (or solid state) sensors. Electrochemical sensors offer high resolution ( $\leq 0.5$  ppm), a linear signal, long-term stability ( $\geq 5\%$  over the lifetime of the sensor) and immunity to false alarms caused by "nuisance gases."



A monoxide ventilation fan controller unit installed in an underground parking facility in Los Angeles, CA demonstrates a typical installation and the recommended installation height as shown in the "breathing zone" to ensure personal safety.

### Decreasing Safety Risks

Prompt warning of high CO concentration can also help prevent fires. The best CO sensing technologies will also alert facility and emergency personnel, via cell phone, in the case of dangerous concentrations of CO, which can indicate the imminent threat of fire.

### Reducing Ventilation Costs

While inadequate ventilation can drastically increase the risks of liability, continuous operation of ventilation systems can be costly. This explains the growing trend toward installation of CO monitoring and ventilation control systems, particularly in large cities where there are many underground parking structures. In many cases, installation of electrochemical CO monitoring and ventilation systems can save up to 85% in energy costs.

To minimize heat loss in winter, as well as conserve energy used by the ventilation fan motors, some parking garage owners began to operate ventilation systems only during peak traffic times of the morning and evening rush hours. This, however, failed to take into

account instances in which a car was left idling or when parking patterns varied from the norm.

Other garage owners decided to run ventilation systems continuously, but this created other problems.

"The presence of CO in a parking structure can create tremendous liability issues, but 24/7 operation is not a good solution," said Jeff Aikens, a project manager with Professional Mechanical Contractors, Inc. "Continuous fan operation can mean continuous annoyance for tenants in apartments or condominiums close to fans."

Aikens described a situation in which an apartment near ventilation fan motors created such noise that it had remained vacant for a long time. PMCI installed a CO monitoring and ventilation system, and noise was greatly decreased, as the fans ran only when the system signaled them to kick on. Soon after, the apartment was rented.

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## **CO Monitoring and Ventilation Systems**

In response to the 1980s energy crisis, Conspec Controls ([www.conspec-controls.com](http://www.conspec-controls.com)) developed an electrochemical CO monitoring and ventilation system that is increasingly in demand today. The Conspec P2621 is often specified due to its large coverage area. For instance, in a garage with 10-foot ceilings, one unit will cover 10,000 square feet, while competing systems require two units in the same space.

For maximum cost efficiency in new construction, the design plan should include an integrated CO monitoring and ventilation system. However, it is never too late for owners of existing garages to realize the cost savings of a CO monitoring and ventilation system.

John Mitchell, Vice President of Santee, who has been specifying monitoring and ventilation systems for more than 20 years, told of an 18-story Los Angeles apartment building where residents on upper floors had complained of nausea and headaches.

Upon investigation, Santee noted that CO from the garage was entering the elevator shaft, and the elevator was acting like a pump, carrying CO to apartments on the upper floor. By installing a monitoring and ventilation system, the CO problem was solved and the owner liability was reduced.

Garage owners and operators should consider the advantages of a CO monitoring and control system: reduced liability, cost savings, energy savings and lower noise levels. Further information can be found at [\*\*www.conspec-controls.com\*\*](http://www.conspec-controls.com).

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