

Carbon Monoxide

Background

Carbon Monoxide (CO) is responsible for numerous illnesses and deaths each year both on the job as well as off the job. Carbon monoxide is a poisonous, colorless, odorless, and tasteless gas that cannot be detected by the senses. It is a by-product of combustion (burning of carbon-containing materials such as natural gas, gasoline, kerosene, oil, propane, coal, or wood) and is often mixed in with gases that you can smell and still not know that CO is present. Internal combustion engines, even when properly maintained, that burn gasoline, propane and to a lesser extent, diesel fuel are the cause of many carbon monoxide poisoning cases. When not maintained properly, internal combustion engines give off extremely high amounts of carbon monoxide gas. Home and industrial heating furnaces with blocked or leaking chimney flues also cause CO poisoning.

Health Effects of Carbon Monoxide

High levels of CO can overcome you in a few minutes or less, without warning. Carbon monoxide displaces oxygen in the blood and deprives the heart, brain, and other vital organs of oxygen. At the highest levels, unconsciousness and death can occur within minutes.

Initial symptoms to inhaling moderate levels of CO may include:

- ◆ Headache
- ◆ Fatigue
- ◆ Dizziness
- ◆ Drowsiness
- ◆ Nausea

The toxic effects depend not only on the CO concentration and exposure time but also on the health of the exposed person. Individuals with heart or lung problems are more at risk as are the elderly, infants and other young children, people living at high altitudes and those with carbon monoxide in the blood already from cigarette smoking. Also CO poisoning poses a special risk to fetuses carried by their pregnant mothers.

Causes of Carbon Monoxide Poisoning

Defective heating systems that burn natural gas, propane, wood, fuel oil or other fuels as well as gas-fired hot water heaters are causes of carbon monoxide poisonings both at home and at work. Obstructions in chimneys and above fireplaces due to debris or flue damage, animal nests, or other deficiencies can trap CO inside and not allow proper venting.

During power outages, especially from wind storms, ice storms and blizzards, members of a household or the entire household may die or become seriously injured due to operating a generator inside their house, often in the basement. The internal combustion engines on these small portable generators are normally gasoline-fueled and have warning labels not to operate them indoors in houses or buildings. To do so is a deadly mistake.

Carbon monoxide from vehicles operating in garages attached to houses also cause carbon monoxide poisonings. Underground parking facilities, during a power failure where large ventilation fans normally operate, also can be deadly. Burning charcoal to barbecue food inside houses and garages is another activity to avoid.

Another potentially lethal situation arises when the occupants of vehicles stranded in snowstorms run the vehicle engine to keep warm. Snow can drift around the exhaust pipe in the rear of the vehicle forcing carbon monoxide into the interior with deadly consequences.

Poorly tuned internal combustion engines give off much more CO compared to those that are well maintained and properly tuned. This can cause higher levels of carbon monoxide in factories and warehouses where propane or gasoline-fueled forklifts operate.

Many firefighter deaths and building occupant deaths from “smoke inhalation” include the effects of inhalation of high levels of carbon monoxide along with the smoke and other gases generated by the fire. The high level of carbon monoxide alone is often lethal without the smoke and other gases. Firefighters must be properly trained in all safety aspects of this dangerous job!

Prevention Strategies

1. Install CO monitors with audible alarms both at home and at work. Carbon monoxide monitors should be purchased and placed in offices located in or attached to factories or warehouses where propane or gasoline fueled forklift trucks operate to warn occupants of this invisible hazard. Wear portable CO monitors with visual and audible alarms if you enter confined spaces at work where CO may be present.
2. Properly maintain heating systems in your home. Have gas-fired hot water heaters and appliances properly maintained. Have a chimney sweep clean and inspect your chimneys periodically. Do not operate internal combustion engines (cars or generators for example) inside your home or garage. This is especially important for electric generators used during power outages. Do not under any circumstances operate these generators, even for short periods, in the basement or any other area of your house or garage, regardless of whether the garage is attached or separate to your house. Some states and municipalities require CO detectors on each level of your home or apartment.
3. If stranded in a vehicle during a snow storm with deep, drifting snow building up where the exhaust gases are discharged, usually at the rear of the vehicle, periodically shovel or sweep the snow away from the discharge point to allow CO to escape away from the vehicle and not enter the passenger areas. Operate the vehicle only for short periods, if possible, to keep warm and always carry emergency clothing to include blankets when it is necessary to drive during severe snow or ice conditions.
4. Propane and gasoline-operated forklift trucks give off carbon monoxide, which requires exhaust ventilation in proportion to the number of units to maintain carbon monoxide to safe levels for both the forklift operators and other building occupants. The owner’s manuals for the forklift trucks should be consulted to determine the ventilation requirement for each unit. The engines on these forklifts must be properly maintained and tuned to minimize CO emissions. Engine modification kits are available to further reduce CO below that of even a well-tuned forklift truck engine. Electric-powered forklifts give off no CO and should be considered as an alternative to propane or gasoline fueled lift trucks.
5. Maintenance garage operators need to take measures to remove carbon monoxide and other products of combustion from vehicle exhausts while being tuned-up inside the garage. A flexible hose slightly larger than the exhaust pipe preferably attached to an exhaust ventilation blower with the discharge directed to outside the garage is desirable regardless of whether the engines being serviced are gasoline, propane, or diesel fueled.

If you hear a CO alarm, evacuate immediately. Leave doors or windows open if possible. Contact your local fire dept.

Carbon monoxide poisoning can be prevented. Don't let this silent killer hurt you or your family

If you have any questions or would like additional information, please contact your local PMA Risk Control Consultant.

IMPORTANT NOTICE - *The information and suggestions presented by PMA Companies in this risk control technical bulletin are for your consideration in your loss prevention efforts. They are not intended to be complete or definitive in identifying all hazards associated with your business, preventing workplace accidents, or complying with any safety related or other laws or regulations. You are encouraged to alter the information and suggestions to fit the specific hazards of your business and to have your legal counsel review all of your plans and company policies.*