

# Carbon Monoxide

---

## Information Sheet

---

This information sheet provides a general overview of carbon monoxide, its health effects and the risks associated with exposure to carbon monoxide in the workplace.

It is targeted at employers, employees and safety representatives and will also be of interest to designers, manufacturers, suppliers and installers of equipment and appliances that may generate carbon monoxide.

### What is Carbon Monoxide?

Carbon monoxide is a poisonous, colourless, odourless and tasteless gas. It is a non-irritant gas that is lighter than air and is very slightly soluble in water.

Due to these properties and the fact that it can be generated accidentally by incomplete combustion (due to lack of oxygen), it is often referred to as a silent killer. It is also known as carbonic oxide or coal gas and is extremely flammable.

### Where can carbon monoxide be encountered?

- ▲ Carbon monoxide is a major industrial gas that has many applications in the manufacture of bulk chemicals, for example, the manufacture of acetic acid.
- ▲ It is also a common industrial hazard created by the incomplete burning of any carbon based fuel. Carbon based fuels include coal, petrol, diesel, liquefied petroleum gas (LPG), natural gas and wood.

### Am I at risk from carbon monoxide exposure?

In the last seven years, there were five work related fatalities attributed to exposure to carbon monoxide. Employees at risk are those working:

- ▲ In locations where there is faulty or inefficient fuel-burning equipment, for example, heaters, furnaces, vehicles, engines, generators, leaking chimneys or vents. You are most at risk from carbon monoxide exposure if you are working in a place where there is a petrol or diesel driven generator or other engine driven appliance, gas heater or other unflued appliance;
- ▲ In the vicinity of appliances which have poorly maintained, damaged, blocked or sealed flues. Heavy condensation in the area and / or staining of the flue is a sign of possible carbon monoxide exposure;
- ▲ With fuel burning powered appliances and tools which generate carbon monoxide. Employees using petrol, diesel or gas driven tools / appliances such as concrete cutting saws, power floats, floor grinders, small mobile plant, diesel forklift trucks, compressors and generators in poorly ventilated areas or confined spaces can be poisoned by carbon monoxide;
- ▲ In the cab of vehicles with defective exhaust systems;
- ▲ Directly with carbon monoxide gas in industrial applications.

Occupations which may be at risk of exposure to carbon monoxide include:

- ▲ Security guards / watchmen;
- ▲ Construction workers;
- ▲ Fire fighters;
- ▲ Garage mechanics;

- ▲ Toll booth attendants;
- ▲ Truck drivers;
- ▲ Welders;
- ▲ Multi-storey or underground car park attendants;
- ▲ Roll on – Roll off (Ro-Ro) workers / dockers.

### **What are the signs of carbon monoxide exposure?**

---

The signs or symptoms of carbon monoxide exposure copy many common illnesses and can easily be confused with flu or simple tiredness. At low levels, carbon monoxide exposure may cause poor concentration, memory and vision problems, and loss of muscle coordination. At higher levels, it may cause headaches, fatigue, vomiting and nausea. At very high levels, the symptoms intensify and it can kill within a matter of hours.

### **How might carbon monoxide enter my body?**

---

Carbon monoxide will enter your body if you breathe in contaminated air. Carbon monoxide is quickly absorbed into the bloodstream from the lungs. Then it combines with haemoglobin in your blood to form carboxyhaemoglobin. This reduces the ability of your blood to carry oxygen around your body and it robs the heart, brain and other vital organs of oxygen.

### **What effect would carbon monoxide have on my health?**

---

The effect depends on how much of the gas you are exposed to and how long you are exposed. Carbon monoxide poisoning can be reversed if it is caught in time. Long term exposure to low levels of carbon monoxide may produce heart disease and damage to the nervous system.

Carbon monoxide is a category 1 reproductive toxin. This means that the substance is known to be toxic for human reproduction - exposure of pregnant women to carbon monoxide may cause reductions in birth weight, cardiomegaly (enlarged heart), delays in behaviour development in neonates and nervous system damage to children.

The level of carbon monoxide normally present in the air we breathe is unlikely to cause ill effect.

### **What legislation is applicable to carbon monoxide?**

---

#### **Safety, Health and Welfare at Work Act, 2005 (No. 10 of 2005)**

Under Section 8 of the Safety, Health and Welfare at Work Act, 2005, the employer has general duties to ensure the safety, health and welfare of his or her employees. Specifically:

- ▲ The employer must manage the work activities;
- ▲ Ensure the design, provision and maintenance of plant and machinery so that they are safe and without risk to health;
- ▲ Ensure safety and prevention of risk to health relating to any article or substance;
- ▲ Provide systems of work that are planned, organised, performed, maintained and revised, as appropriate, so as to be safe and without risk to safety and health;
- ▲ Provide training, instruction, information and supervision;
- ▲ Carry out a written risk assessment and implement the findings.

#### **Safety, Health and Welfare at Work (Chemical Agents) Regulations, 2001 (S.I. No. 619 of 2001)**

Under Regulation 4 of the chemical agents' regulations, the employer must determine whether any hazardous chemical agents are present in the workplace and must assess any risks to the safety and health of employees arising from their presence. With respect to carbon monoxide, this requires that the employer identifies all potential causes of exposure. This includes activities where carbon monoxide may be deliberately used but also where it may be produced as an incidental part of an industrial process or work activity. In carrying out the assessment, measures to control exposure to carbon monoxide must be identified and implemented.

## **Safety, Health and Welfare at Work (General Application) Regulations, 2007 (S.I. No. 299 of 2007)**

Part 6, Chapter 2 of these regulations covers the protection of pregnant, postnatal and breastfeeding employees. One of the requirements of these regulations is that the employer assesses the risk to the safety or health of employees and any possible effect on the pregnancy of, or breastfeeding by, employees, resulting from any activity at that employer's place of work likely to involve a risk of exposure to carbon monoxide.

## **Safety, Health and Welfare at Work (Confined Spaces) Regulations, 2001 (S.I. No. 218 of 2001)**

If your employees work in confined spaces where carbon monoxide may be present, you must ensure that you comply with this legislation and the associated Code of Practice for working in confined spaces.

Note the above is not an exhaustive list of legislation that is applicable to carbon monoxide and is not in any order of precedence. Other relevant legislation may also be applicable to your work activities.

### **What is the Occupational Exposure Limit Value (OELV) for carbon monoxide?**

---

An Occupational Exposure Limit Value (OELV) is the maximum permissible concentration of a chemical agent in the workplace to which workers may be exposed when measured or calculated by reference to a specified time period. The OELV for carbon monoxide (as outlined in the 2007 [Code of Practice](#) for the Safety, Health and Welfare at Work (Chemical Agents) Regulations, 2001) is:

<b>Reference Period</b>	<b>Parts Per Million (ppm)</b>	<b>mg/m<sup>3</sup></b>
8 hour	20	23
15 minute	100	115

### **As an employer, how can I help prevent carbon monoxide exposure?**

---

You can reduce the chances of carbon monoxide exposure in your workplace if you:

- ▲ Check your workplace to see if you have any equipment, tools or appliances that produce carbon monoxide.
- ▲ Do not use petrol / diesel powered engines or tools in poorly ventilated areas, inside buildings or in partially enclosed areas unless:
  - The engines can be located outside with at least a metre of clear space all around, in order to ensure adequate ventilation. Ensure that the engine is also situated away from air intakes, for instance air conditioning intakes and air vents;
  - An effective ventilation system that will remove carbon monoxide from work areas has been installed.
- ▲ Ensure appropriate hazard warning labels are placed on any equipment, tools or appliances likely to produce carbon monoxide.
- ▲ Change from petrol / diesel powered equipment to equipment powered by electricity, batteries or compressed air, provided it can be used safely.
- ▲ Maintain and service equipment and appliances. Ensure that equipment is installed and maintained by a competent person.
- ▲ Ensure that existing vents are working and are not blocked.
- ▲ Educate workers about carbon monoxide exposure, ensure that they know how to recognise the symptoms and signs of exposure.
- ▲ Ensure that only authorised personnel operate any equipment, tools or appliances that are likely to produce carbon monoxide and that those personnel have adequate instruction, information and training.

- ▲ Install carbon monoxide monitors with audible alarms or provide personal carbon monoxide monitors if a risk of exposure to the gas exists. Such monitors should be used as a backup and not as a replacement for safe systems of work and the proper use and maintenance of equipment.
- ▲ Provide the necessary personal protective equipment for workers (for example, self contained breathing apparatus for firemen) who may be required in certain circumstances to carry out work where carbon monoxide may be present.

### **As an employee, how can I help prevent carbon monoxide exposure?**

---

You can reduce the chances of carbon monoxide exposure in your workplace if you:

- ▲ Do not operate any equipment, tools or appliances unless fully authorised and trained;
- ▲ Follow safe systems of work and take notice of hazard warning labels;
- ▲ Report to your employer any situations that might cause carbon monoxide to build up;
- ▲ Are alert to ventilation problems – especially in enclosed areas where the gas from burning fuels may be released;
- ▲ Recognise the symptoms and signs of overexposure;
- ▲ Report promptly complaints of dizziness, drowsiness or nausea;
- ▲ Leave a polluted area once you suspect carbon monoxide exposure.

If you get sick you should tell your doctor if you think you may have been exposed to carbon monoxide.

### **As a designer, supplier, manufacturer or installer of appliances, equipment or tools, how can I help prevent carbon monoxide exposure?**

---

- ▲ Ensure that appropriate hazard warning labels are placed on any equipment, tools or appliances likely to produce carbon monoxide.
- ▲ Provide adequate information to the user so that they can operate the appliance, equipment or tools safely and correctly.
- ▲ Maintain any rental or leased equipment, tools or appliances in good working order, especially those that can produce carbon monoxide.
- ▲ Ensure that personnel installing any equipment or appliances that may produce carbon monoxide are competent and have adequate instruction, information and training.

### **Where can I get further information?**

---

Further information about carbon monoxide is available from [www.carbonmonoxide.ie](http://www.carbonmonoxide.ie)

For information about safety and health in the workplace, see [www.hsa.ie](http://www.hsa.ie) or contact our Workplace Contact Unit at 1890 289 389.