

Office of the Fire Commissioner

Building and Fire Safety Section



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The purpose of this bulletin is to explain the Office of the Fire Commissioner's requirements and procedures relating to Carbon Monoxide Detectors and Alarms for Homes and Small Buildings.

Carbon Monoxide (CO) is often known as the "silent killer" because it is a colorless and odourless gas. Once inhaled over a period of time, CO interferes with the blood's ability to absorb and transport oxygen. CO absorbs 200 times faster in the blood stream than normal oxygen. For every one hour of exposure, it takes the body six hours to rid itself of CO.

CO is produced when fuels such as wood, coal, charcoal briquettes, heating oil, gasoline, diesel, propane, kerosene and natural gas burn without enough oxygen. Some appliances which burn these types of fuels are fireplaces, furnaces, hot water tanks, barbeques, gas stoves, camping stoves, cars, lawn mowers, chainsaws, snow blowers or anything with an internal combustion engine or that is gasoline powered.

CO is also produced by humans as they breathe. If you have a CO detector with a digital readout it may indicate small amounts of CO in the air.

CO poisoning is also a risk from outside the home, i.e., where a vehicle is left running in an attached garage, next to an open window or near a fresh air intake. Other possibilities are operating a barbeque in an enclosed space or a gas stove (range) without turning on the range vent hood and infrared heaters without an exhaust venting system.

The following signs may indicate the presence of CO in your home¹:

- a CO detector that alarms. Never unplug it or remove the batteries – when the alarm sounds, it is for a reason;
- stuffy, stale air;
- more condensation than usual on your windows;
- soot buildup around a fireplace, chimney or other fuel-burning equipment;
- back drafting of your fuel-burning equipment;
- a pilot light that repeatedly goes out.

What should you do if your CO alarm goes off?²:

1. Do not ignore the alarm.
2. If you experience any symptoms of CO poisoning, call your local emergency services.
3. If you suspect equipment malfunction, immediately turn off the fuel-burning equipment or appliance and contact Manitoba Hydro at 1-888-MBHYDRO (1-888-624-9376).

¹ Manitoba Hydro, "Carbon Monoxide Safety". October 2016.

² Manitoba Hydro, "Carbon Monoxide Safety". October 2016.

Exposure to carbon monoxide causes flu-like symptoms such as headaches, nausea, dizziness, drowsiness, confusion, impaired judgement, loss of manual dexterity, and even loss of consciousness. In severe cases, CO poisoning can cause brain damage and death. The elderly, children, people with heart and respiratory conditions, and pets may be particularly sensitive to CO and may feel the effects sooner.³

If you believe you or any member of your household is affected, or if any of these symptoms go away when you leave home for a period of time you should suspect CO poisoning and take immediate action.

REGULATIONS FOR CO DETECTION EQUIPMENT IN MANITOBA

Based on changes to the 2011 Manitoba Building Code, CO alarms/detectors are now required to be hard wired in **all new buildings** in Manitoba. This includes private homes and public and private buildings. In the case of a home or small residential building, the CO alarm must be interconnected to the smoke alarms. Where a fire alarm system is required, the CO detectors must be interconnected to the fire alarm system or a separate CO system.

The 2011 Manitoba Fire Code goes a step further for public and some private buildings. The 2011 changes now require that a CO detector be installed in **all buildings** that are required to have a Fire Safety Inspection by Regulation and where there is a potential risk for CO infiltration. These buildings include hospitals, personal care homes, elderly persons housing, Manitoba Liquor Control Commission (MLCC) licensed establishments, restaurants with living quarters, schools, daycares and assembly occupancies in Manitoba. For more information see the Statutory Publications website at <http://web2.gov.mb.ca/laws/regs/current/pdf-regs.php?reg=155/2011>

The authority having jurisdiction for the fire safety inspection has the authority to determine what level of CO protection is required based on a risk analysis.

ACCEPTABLE UNITS AND INSTALLATION

- In new construction of homes, (Canada Electrical Code), CO detectors must be interconnected to the smoke alarms/detectors and heat detectors. These units must be wired as a part of a lighting circuit. The intent of this is to ensure that they cannot be easily shut off. These circuits must NOT be protected by GFCI or AFCI circuits.
- Certain new buildings will have requirement for CO detection at the time of design and these systems will be incorporated into the building.
- In existing buildings, wall mounted battery operated CO detectors are acceptable and are available at most hardware stores in Manitoba.
- Detectors with a digital read-out are the best option. These detectors provide the occupants with an opportunity to monitor CO levels prior to the activation of the alarm.
- Combination Smoke and CO alarms are recommended as they reduce the number of units to be maintained.
- CO detectors in facilities with children and youth must be wall mounted. Plug in detectors cannot be used. Attaching the plug in detector to the wall by means of a band is not permitted by the Canadian Electrical Code.

³ British Columbia Office of the Fire Commissioner and Terasen Gas, "Carbon Monoxide Safety – Understanding the Silent Killer".

- All CO detectors must be installed in accordance with the manufacturer's instructions.
- The life expectancy of the unit is always noted on the packaging. This date should be documented in the building's fire safety plan, if required. If not, the date should be written on the unit itself and replaced accordingly.
- Plug in detectors with battery backup are permitted to be used in addition to battery operated, wall mounted systems but cannot be used to satisfy this code requirement on their own.

CARBON MONOXIDE Q&A

1. What is Carbon Monoxide (CO)?

Carbon Monoxide is a Colourless, odourless and tasteless gas produced when you burn substances such as propane, natural gas, gasoline, oil, wood and coal.

2. What are the health risks?

CO does not displace oxygen. When you breathe it in, it builds up and combines with the blood to produce carboxyhemoglobin (COHb) which reduces the ability of the blood to absorb and carry oxygen.

3. What levels of CO can cause problems?

CO concentration in parts per million (ppm)	Effects
0 – 2	Normal conditions in and outside Canadian houses.
10	Recommended exposure limit over a 24-hour period. ³
25	Recommended exposure limit over a 1-hour period. ³
30	CO detectors are not allowed to sound alarm unless this concentration is maintained for more than 30 days. ²
70	CO detectors must sound alarm within 1 to 4 hours. ²
150	CO detectors must sound alarm within 10 to 50 minutes. ²
200	Slight headache, fatigue, dizziness and nausea after 2 to 3 hours. CO detector alarm must sound within 35 minutes. ⁴
400	CO detectors must sound alarm within 4 to 15 minutes. ²
800	Dizziness, nausea and convulsions within 45 minutes, death within 2 to 3 hours. ⁴
1,600	Death within 1 hour. ⁴
13,000	Danger of death after 1 to 3 minutes. ⁴

Sources:

1. Canada Mortgage and Housing Corporation, *About your House – Carbon Monoxide (CE 25)*, 2011.
2. Canadian Standards Association, *CAN/CSA 6.19-01: Residential Carbon Monoxide Alarming Devices* (Canada: Canadian Standards Association, 2001).
3. Canada. Health Canada, *Residential Indoor Air Quality Guideline: Carbon Monoxide* (Ottawa: Minister of Health, 2010). Available online at http://www.hc-sc.gc.ca/ewh-semt/pubs/air/carbon_mono/index-eng.php
4. T. H. Greiner, *Carbon Monoxide Poisoning (AEN-172)* (Ames: Iowa State University of Science and Technology, 1997).

4. How Can I Eliminate Sources of Carbon Monoxide in My Home? ¹

The most important step you can take to eliminate the possibility of CO poisoning is to ensure that CO never has an opportunity to enter your home. This is your first line of defence. Review this list to minimize the risk of CO in your home.

- Have a qualified technician inspect and clean fuel-burning appliances yearly to ensure they are in good working order.
- Have a qualified technician inspect chimneys and vents yearly for cracks, blockages (e.g., bird's nests, twigs, old mortar), corrosion or holes.
- Check fireplaces for closed or blocked flues.
- Check with a qualified technician before enclosing heating and hot water equipment in a smaller room, to ensure there is adequate air for proper combustion.
- If you have a powerful kitchen exhaust fan or downdraft cooktop, have a qualified technician check that its operation does not pull fumes back down the chimney.
- Never use propane or natural gas stove tops or ovens to heat your home.
- Never start a vehicle in a closed garage; open the garage doors first. Pull the car out immediately onto the driveway, then close the garage door to prevent exhaust fumes from being drawn into the house.
- Do not use a remote automobile starter when the car is in the garage; even if the garage doors are open.
- Never operate propane, natural gas or charcoal barbecue grills indoors or in an attached garage.
- Avoid the use of a kerosene space heater indoors or in a garage. If its use is unavoidable provide combustion air by opening a window while operating. Refuel outside after the unit has cooled.
- Never run a lawnmower, snowblower, or any gasoline-powered tool such as a whipper snipper or pressure washer inside a garage or house.
- The use of fossil fuels for refrigeration, cooking, heat, and light inside tents, trailers, and motorhomes can be very dangerous. Be sure that all equipment is properly vented to the outside and use electric or battery-powered equipment where possible.
- Regularly clean the clothes dryer ductwork and outside vent cover for blockages such as lint, snow, or overgrown outdoor plants.
- Reduce or eliminate the use of fondue heaters indoors.
- If you live close to a road with heavy traffic, outdoor carbon monoxide levels can affect your indoor air quality, especially during rush hour. Such levels should not set off a CO alarm, but slightly elevated CO levels might be observable on some types of CO detectors with a digital display.

5. What Features Should I Look for When Purchasing a CO Detector? ¹

- Most CO detectors are designed to give an alarm when CO levels reach a high level in a short time. However, health agencies advise that long-term, low-level exposure is also of concern, especially for the unborn and young children, the elderly and those with a history of heart or respiratory problems.¹ Detectors that can display both high and low levels are more expensive but they do provide greater accuracy and more information.
- Look for a detector that is listed with the Canadian Standards Association (CSA) standard. The logos of the testing agency will be on the product.
- Choose a detector with a memory if you want to monitor long-term, low-level exposure and short-term, high-level exposure. Peak levels, no matter what the level of concentration, can be viewed by pressing a button.

- Battery-operated units allow detector placement in the most convenient location. However, any battery-operated device requires the user's diligence in replacing worn-out batteries.
- No detectors will operate properly forever. Replace them at least every five years, unless the manufacturer specifies a shorter or longer life.

6. Are there Detector Sensitivity Issues? ¹

The standards organizations of Canada (CSA) and the United States (Underwriters Laboratories or UL) have coordinated the writing of CO standards and product testing. The standards as of 2010 prohibit showing CO levels of less than 30 ppm on digital displays. The most recent standards also require the alarm to sound at higher levels of CO than with previous editions of the standard. The reasoning behind these changes is to reduce calls to fire stations, utilities and emergency response teams when the levels of CO are not life threatening. This change will also reduce the number of calls to these agencies due to detector inaccuracy or the presence of other gases. Consequently, new alarms will not sound at CO concentrations up to 70 ppm. Note that these concentrations are significantly in excess of the Canadian health guidelines.

7. What is the difference between a CO detector and a CO alarm?

A CO Detector is a unit that detects the presence of CO and communicates a signal to an alarm panel. The alarm panel then signals all building occupants of a CO issue. A CO alarm has the detection and alarm built into it, when activated the alarm will sound only in the immediate area.

Further information

Please call the Building and Fire Safety Section at 204-945-3322 for any questions or clarifications.