



Camping Appliance Safety

Carbon Monoxide Poisoning

Camping appliances need air. The majority of deaths associated with the use of camping appliances have been attributed to carbon monoxide (CO) poisoning. Without proper ventilation stoves and lamps can give off poisonous carbon monoxide. A faulty appliance may also emit carbon monoxide even in well ventilated areas.

Carbon monoxide is a toxic gas that is both colourless and odourless. Carbon monoxide poisoning can produce the following symptoms, headache, nausea or dizziness. Prolonged exposure or high levels will result in collapse, unconsciousness and even death.

When hydrocarbon fuels burn they combine with oxygen to produce heat and light through a series of chemical reactions. In normal circumstances, carbon dioxide and water vapour are produced as waste products. However if

these reactions are interfered with in some way, then carbon monoxide can be emitted.

If there is not enough oxygen to sustain combustion through lack of ventilation, carbon monoxide is generated. Quenching or flame cooling can occur when a pot is placed directly on the burner head rather than being offset by the metal pot stand that a cooker normally has. This disrupts the series of reactions and lethal carbon monoxide is produced.

If an appliance is faulty it may produce carbon monoxide even if supplied with good ventilation. In such cases it becomes extremely dangerous to use the appliance in a small enclosure such as a hiking tent, car or a poorly ventilated caravan.

The poisonous gas can build up to fatal levels as the gas cannot be diluted by incoming fresh air quickly enough.

- Whenever possible **use appliances outside**
- **Never use in confined spaces** such as small tents
- If inside, make sure there's **plenty of space and ventilation**
- **Ventilation should allow air to move** across the space with openings at high and low levels.
- Keep appliances in **good condition**
- Always **follow the manufacturer's instructions**
- Give your flame **room to burn**
 - it should just touch the bottom of the pot not spill around the sides
- If your appliance is malfunctioning
 - Stop using it.



This applies to all appliance fuel types – Liquid, Solid and Gas

Gas Canister Overheating

Liquid Petroleum Gas canisters contain butane, propane or a mixture of the two in liquid form. If a highly reflective surface such as a pot is used on a LPG cooker with an integral fuel tank then the heat radiating down can overheat the canister to the point where the canister will rupture. This is known as a Burning Liquid Expanding Vapour Explosion or BLEVE.

When heated, the liquid gas inside the canister will start to boil which leads to an increase in the pressure inside the canister. Exposure to temperatures higher than 50° Celsius will lead to dangerous pressures which may rupture the canister. While the appliance is in use, most of the pressure is being relieved through the valve and burner. However, when the gas valve is shut the pressure starts to increase and this can lead to a rupture. If there is any source of ignition the escaping gas will ignite creating a large explosion.

Storage and Disposal of Fuel Canisters

- Always store LPG canisters in a cool place out of direct sunlight. Canisters placed on the back window shelf of cars have ruptured!



- Always change canisters on appliances outside, especially when other appliances are being used inside. The canister may still contain some fuel. For the same reasons other liquid fuelled appliances should also be refilled outside (once they have cooled down).
- Never dispose of empty canisters by throwing them in the fire. They may not be completely empty and will explode. Respect the outdoors, pack out what you pack in.



Keep a large vent open on both ends of your tent if you are forced to cook inside

Inadequately Maintained and Faulty Appliances

Appliances can and will wear out. Plastic and rubber seals will deteriorate resulting in fuel leakage. The jets in burners can become clogged resulting in incomplete combustion.

If parts of the appliance go missing it may result in the appliance not functioning correctly. For instance a missing pot holder may lead to a cooking pot being placed too close to the flame. This will cause incomplete combustion, resulting in the production of poisonous carbon monoxide.

Make sure your appliances are in good working order before you leave home. If you suspect there is any problem take it to an appropriate servicing agency.

For more information about mountain skills training contact:

South African Mountaineering Development & Training Trust

www.mdt.za.org
info@mdt.za.org

or

Any of the trainers listed on the MDT website

Errors, corrections or suggestions for improvements for this training sheet may be forwarded to:



Andrew Friedemann
Wildways Adventures
www.wildwaysadventures.co.za or info@wildwaysadventures.co.za

ver 2.1 3 July 2007