

# INTRODUCTION TO PROPANE HEATER SAFETY

LECTURE & PRESENTATION NOTES

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Reading Time: 15 minutes

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# Introduction to Propane Heater Safety

This presentation reviews propane and propane heater safety on construction jobsites. This information is presented especially for Security Guards who must do a fire watch due to the use of these heaters.

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## Why Propane Heaters are used

Propane heaters, often referred to as salamanders are temporary heaters fueled by propane, to keep a partially built area on a construction site warm during the colder months. This is necessary in order for concrete, plaster and paint to dry or cure properly as these items are water based and without the heat, the water would freeze and damage would occur. As well, a propane heater may be used to temporarily heat an area of an unfinished building to reduce the pipes from freezing and bursting resulting in water damage.

## Certification Required

Under the Technical Standards and Safety Act, an Ontario law, no one may activate, switch on or off, reset, connect or disconnect a propane heater or torch unless they are the holder of a CH-02 certificate issued under the authority of the Technical Standards and Safety Authority (TSSA). The CH-02 certificate authorizes the holder to operate appliances up to 400,000 BTU but does not authorize the holder to perform repairs. For appliances over 400,000 BTU, a CH-01 certificate is required. CH-01 and CH-02 certificate holders must always carry their document when working with an appliance.



## Propane Characteristics

Propane, as with any fuel, is safe when a person knows how to use it, store it and its characteristics. Thus, it is critical to know how to safely use propane and operate a heater before you begin. Propane is highly flammable and has a low flashpoint, which means it can easily be ignited to a flame in a minimum propane mixture of 2.4% to air. Sources of ignition may include pilot lights, open flames, cigarettes, sparks, static electricity and cell phones. Propane is 1.5 times heavier than air, which means if leaked, it does not float up in the air but stays close to, and travels along the ground, entering sewers, basements and floor drains to name a few. Propane expands from a liquid state to a gaseous state at the rate of 1 to 270. This means that 1 cup of liquid propane can expand to fill up 270 cups with propane vapour (gas).

## Propane Exposure

Exposure to propane can cause critical injury or death. Propane is naturally odourless and Ethyl Mercaptan is added to give it the odour of rotten eggs or boiled cabbage, as a warning of its presence. If a person breathes in large amounts of propane, suffocation and death are possible.

The symptoms of propane exposure are headaches, nausea, dizziness, difficulty breathing and loss of consciousness. At the first sign of these symptoms, switch off the equipment if possible, and immediately get out to fresh air. If a person has stopped breathing, get them to fresh air, start artificial respiration immediately and get medical aid.

Skin exposed to propane will result in severe frostbite. If this occurs warm the affected area with body heat and get to medical aid.

Eye exposure to propane will result in blindness. If this occurs flush the affected eyes with lukewarm water for at least 15 minutes with eyes open, get medical aid immediately.

## Personal Protective Equipment

It is because of these two exposure risks, personal protective equipment (PPE) in the form of **neoprene** gloves and goggles must be worn when connecting and disconnecting propane tanks/cylinders and appliances. Only **neoprene** gloves may be worn when working with propane, as standard work gloves and rubber gloves provide no protection against propane exposure, and may melt or disintegrate as propane is a solvent. Additional exposure reduction to propane is accomplished by wearing a long sleeve shirt to avoid upper arm injury exposure.



## Proper Ventilation & Carbon Monoxide

Propane heaters require proper ventilation to operate. A heater operating in a poorly ventilated area will have incomplete combustion of hydrocarbons resulting in the accumulation of carbon monoxide.

Signs of poor ventilation are a yellow flame in the heater, the heater may not light, and the heater may not stay lit. The immediate solution is to increase the air ventilation by opening a window/door or using a fan to increase air movement.

Carbon monoxide is an odourless, clear gas that is poisonous and overexposure may result in death.

Personal signs of carbon monoxide poisoning are; headache, fatigue, flu-like symptoms and dizziness leading to arrested breathing, loss of consciousness, heart failure and death. If you suspect you are suffering these symptoms, leave the area immediately to fresh air and get medical aid.

## Personal Protective Equipment (PPE) Inspection

1. Examine Safety Goggles for cracks, deterioration, other damage and ensure elastic headband will securely attach to your head
2. Examine Gloves to ensure they are **Neoprene** NOT rubber and check for cracks, deterioration, other damage and check to see the gloves fit properly.

## Propane Tank Inspection

1. Hand wheel not bent or broken
2. Threads on service valve are not bent or cracked
3. Dust cap installed on pressure relief valve
4. Collar in good condition (no rust, not bent, missing or loose) and provides protection to valves
5. Foot ring in good condition (no rust, not bent, missing or loose) and allows the tank to stand securely
6. General cylinder condition indicates no holes, dents, severe rust or other damage
7. WHMIS & TDG labels are present and legible
8. Transport Canada date code is within 10 years.



## **Heater Inspection, Lighting & Shutdown**

### **Inspect**

1. Examine heater condition (no rust, missing or loose connectors, supply hose, cord and plug in good condition)
2. Put on your personal protective equipment (PPE)

### **Connect**

3. Connect supply hose to propane cylinder by turning counter (anti) clockwise –use a fixed wrench only
4. Connect supply hose to the heater by rotating the hose fitting clockwise –use a fixed wrench only
5. Securely tighten all gas connections – use a fixed wrench only

### **Leak Test**

6. Open the cylinder valve slowly one quarter turn and check (spray) for leaks using soap/water solution at cylinder end
7. Check (spray) for leaks using soap/water solution at heater end
8. Open the cylinder valve slowly to full
9. Connect power cord to well-grounded power source
10. Allow fan to run for 20-30 seconds to purge fuel

### **Ignition**

11. Press the fuel button to light heater
12. Once lit, keep the button depressed for 60 seconds then release
13. Set control knob to desired level

### **Shutdown**

14. Put on your personal protective equipment (PPE)
15. Slowly close the cylinder valve all the way to a hand tight close
16. Continue to operate the heater until all the fuel in the hose has burned off
17. Unplug the power cord
18. Disconnect supply hose from propane cylinder and disconnect heater –use a fixed wrench only

## **Propane Leak Detection**

- Visible frost on brass couplings
- Smell of rotten eggs or boiled cabbage
- Hissing sound at tank or equipment connections
- Use a spray bottle with soap-water or soap-antifreeze solution. Spray it on couplings, see if bubbles appear. If bubbles appear, a leak is present.

## **Cylinders & Tanks**

- A maximum of three 100 lb. cylinders may be connected to a manifold.
- Cylinders and tanks must be 10 years or less in order to be safely used.
- Cylinders and tanks cannot be stored indoors. They may only be indoors if they are hooked up to equipment that is being used or, in special cases be stored inside an explosion proof room.
- Liquid propane must never come in contact with the Pressure Relief Valve on a cylinder or tank.
- A regulator is required when using a propane cylinder or tank indoors.
- The Liquid Service Valve must be fully open to allow the Excessive Flow Valve to operate properly if a line were severed.
- Cylinders and tanks must be kept a minimum of 10 feet and a maximum of 25 feet away from connected equipment.
- Cylinders and tanks must be transported in an upright and secure position.
- Cylinders and tanks on a construction site must be stored a distance of 25 feet from adjacent properties.
- If a defective cylinder or tank is found, tag out procedures must be followed and a supervisor notified.

## Propane Heater Safe Distances

- Must be kept a minimum clearance distance of 10 feet away from combustible materials.
- When walking in front of a propane heater, a minimum distance of 10 feet must be maintained.

## Fire Extinguisher

- A class B, BC or ABC fire extinguisher must be present and accessible when using propane fueled equipment on a construction site.
- Before using a fire extinguisher, the gas supply must be shut off to the appliance.
- A fire extinguisher can only be used on a fire during the incipient stage, once beyond this stage the Fire Department must be called.
- If in doubt, call the Fire Department.

## In the Event of Fire

- Shut off the propane gas supply to the appliance if it is safe to do so.
- Call the Fire Department if you cannot shut off the gas supply in a fire situation.
- If you are unsure, always call for help.



# About

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Robert Ing is a forensic intelligence specialist and has appeared on North American news networks on the issues of technology crime, computer security, privacy and identity theft. With over 25 years experience in the public and private safety and security sectors, he has worked in the biomedical, technical, privacy and risk management aspects of safety and security.

He is an approved instructor for the Ontario Security Guard Curriculum, an Ontario CPO approved training provider instructor and Ontario TSSA training program instructor.

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