Forklift Trucks – Hazards of Propane – Fact Sheet



WHAT ARE THE OCCUPATIONAL HAZARDS OF PROPANE FUEL?

Exposure to high levels of propane fuel occurs generally only while filling tanks or from a leak from the tank or fuel delivery system. Propane gas is heavier than air; so leakage from a vehicle parked or stored near an unventilated pit or a lower level room is a hazard.

Propane gas is very flammable and is a fire

Brief exposures to concentrations of propane up to 10,000 parts propane per million parts of air (ppm) do not cause any symptoms in humans. Exposures to very high concentrations of propane (100,000 ppm) can produce slight dizziness after a few minutes of exposure. At extremely high concentrations (several hundred thousand parts per million), propane acts as an asphyxiant by displacing oxygen. This fact means that a person could suffocate if exposed to high enough concentrations of propane because it dilutes the oxygen in the air.

There are very few reports of overexposure to propane. Some people have reported symptoms of disorientation, excitation, headache and vomiting.

What are hazards of propane combustion products?

Complete combustion of propane results in the formation of carbon dioxide and water vapour. Carbon monoxide is a by-product of combustion when there is not enough oxygen to burn the propane completely.

Carbon monoxide and carbon dioxide are hazards when propane-powered equipment is used in enclosed, poorly ventilated areas. Symptoms of carbon monoxide and carbon dioxide overexposure include headache, fatigue, dizziness and nausea. Carbon monoxide is a toxic gas that interferes with the ability of the red blood cells to carry oxygen. Exposure to very high concentrations of carbon monoxide (more than 4,000 parts per million (ppm)) can result in coma or death.

Because carbon dioxide is an asphyxiant gas, exposure to extremely high concentrations (above 100,000 ppm) can result in death. Such life-threatening concentrations are very unlikely to occur in most workplace situations. However, symptoms of headache, fatigue and dizziness may show that there is inadequate

ventilation in the workplace. The frequency of complaints of these symptoms increases as the carbon dioxide levels increase above 800 to 1,000 ppm.

How can you control the exposure to propane and its combustion products?

Regular maintenance, tuning of propane-powered engines and inspection of vehicle exhaust systems for leaks keep the exposure to a minimum.

To control exposure to propane during refueling the generally recommended procedures include:

- storage, refilling and handling of liquid propane fuel by qualified or trained personnel
- refueling or exchanging removable propane cylinders outdoors or in well ventilated areas, away from sources of ignition

The refueling area should be equipped with a fire extinguisher.

When using propane-powered equipment indoors, ensure that there is adequate ventilation in the workplace. Some jurisdictions may recommend specific ventilation rates.

In the Industrial Ventilation: A Manual of Recommended Practice for Design, 30th edition (2019) published by the American Conference of Governmental Industrial Hygienists (ACGIH), they provide recommended dilution ventilation rates based on average operating conditions as 10,000 acfm (5.00 am3/s) (or more) per propane fueled operating truck, where acfm stands for “actual flow rate in cubic feet per minute”. This recommendation applies when:

- vehicles are maintained regularly and appropriately
- lift trucks are used less than 50% of the working day (less than 4 hours in an 8 hour shift)
- a reasonably good air flow distribution
- volume of space is 150,000 ft3 (13,500 m3) per lift truck or more
- lift truck is powered by an engine of less than 60 horsepower (745 watts) [note: ACGIH cites the conversion of 60 horsepower as 745 watts; however, 1 mechanical horsepower is approximately 745 watts, making the conversion 44,742 watts.]

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