

Transport by vehicle of liquid nitrogen in containers of less than 450 litres capacity

SCOPE

These guidance notes are for the user of portable cryogenic vessels of less than 450 litres capacity. These guidance notes do not substitute any part of statutory regulations where they apply to certain vessels.

VESSELS

Any vessel used should be vacuum insulated and in good condition. The vessel must have provision for venting gas that boils off from the liquid. Vessels should be labelled, indicating the contents and the potential hazards.

LOADING

The liquid nitrogen vessel should, where possible, be carried in an open vehicle or trailer. If this is not possible and the container is to be transported in the passenger compartment (including the boot area) then consideration must be given to the risk of asphyxiation. Whatever the position of loading the vessel must ALWAYS be secured in an upright position and NOT HELD BY HAND. Open dewars containing more than 0.3 litres should not be carried in the passenger compartment.

HAZARDS

Carriage of liquid nitrogen within a vehicle may lead to potential hazards from escape of gas or spillage of very cold liquid nitrogen. The significant hazards are:—

- a) Spillage of cryogenic liquids can cause cold burns, frost bite or hypothermia. Spillage also releases gas into the atmosphere. For example, one volume of liquid will release 683 times that volume of gas.
- b) Release of gas can cause a dramatic change in the surrounding atmosphere. Release of nitrogen can cause oxygen deficiency and lead to asphyxia of personnel in the area. An atmosphere containing less than 18% oxygen is potentially hazardous and entry into atmospheres containing less than 20% oxygen should be avoided.

All cryogenic liquid storage vessels will produce gas as a result of normal heat in leak through the vacuum insulation. Generally 1% to 2% of the liquid content is converted to gas in 24 hours. When open dewars, refrigerators or other non-pressurised vessels are used this gas will enter the atmosphere creating a potential hazard in a confined space. In pressure vessels this gas builds up until the relief valve pressure is reached, at which point the valve opens and allows gas to vent to atmosphere, the valve will reset when the pressure falls below the relief valve set pressure. In the unlikely event that the relief valve is unable to cope with a rapid build up of pressure the burst disc will rupture once the pressure reaches the design failure pressure. When the disc bursts the decrease in pressure will result in rapid boil off of liquid and venting of the pressurised gas. Similarly in the event of vessel failure due to impact or other cause all gas will be released rapidly to atmosphere.

PRECAUTIONS

Always ensure that:—

1. Ventilation is adequate to maintain the atmosphere at 20.8% oxygen concentration — use a fan and ventilation from the outside air and open windows. An oxygen monitor should be used to detect nitrogen enrichment. The positioning of the monitor should be away from any ventilation source.
2. Pressure vessels are fully depressurised prior to transport and all valves are fully closed.
3. Passengers and driver are not liable to be splashed with liquid from any open dewar in the event of a collision and the vessel is fully secured away from any potential impact.

To calculate the worst scenario, refer to BOC Guidance Notes for users of liquid cylinders of low pressure cryogenic liquid supply vessels — G4521 2.90

EMERGENCY ACTIONS

In the event that liquid spills from an open dewar while being transported, the window closest to the driver and any passengers should be fully opened to ventilate the vehicle and provide air to the occupants. The vehicle should be parked in an area that will not cause a hazard and the spilt liquid allowed to boil off and ventilate from the vehicle (open all doors and windows to assist this). All occupants should leave the vehicle.

Should a pressure vessel reach the relief valve set pressure and gas escape (see 'precautions 2') the vehicle should be immediately ventilated and vehicle parked in a safe area that will not cause a hazard. All occupants should leave the vehicle. When safe to do so the vessel should be removed from the vehicle and fully depressurised, checking for the cause of the rise in pressure (this may have been caused by the pressure raising valve being activated). Providing the pressure can be reduced the vessel may be reloaded, secured and the journey continued with caution.

Note:—Under the Health and Safety at Work Act 1974 a safe system of work should be adopted where practical when a potential hazard has been identified.

BOC Cryospeed can provide a point of use delivery service of small quantities of liquid nitrogen to avoid personal risk.

ADDITIONAL BOC REFERENCES

Care with Cryogenics G2246.
Prevention of Oxygen Enrichment or Deficiency Accident G4256.
Treatment of Cryogenic Burns & Frostbite G4968.
Nitrogen Data & Safety Sheet G4095.
BOC Cryospeed Liquid Nitrogen G4292.

ASPHYXIATION WARNING: LIQUID NITROGEN IS A RISK TO LIFE
WHEN TRANSPORTED INSIDE A
PASSENGER VEHICLE