

GUIDANCE NOTES

For the movement of Cryogenic Vessels in lifts containing Nitrogen, Argon, Oxygen or Carbon Dioxide as liquid or vapour with a vessel capacity of 200 litres or less.

MOVEMENT OF CRYOGENIC VESSELS IN LIFTS

Filling

Liquid Cylinders or Vessels which are to be filled on customers premises shall always be filled in open air unless installed with an approved remote filling arrangement. BOC Gases can advise on the suitability of filling sites.

Location

Where possible vessels should be located outside of buildings when both in use or storage.

If this is not reasonably practicable, liquid cylinders or vessels should be located in a well ventilated area. See BOC Cryospeed Guidance Note 4521 - Siting of liquid cylinders or vessels in buildings.

Hazards

The movement of vessels from an internal location to the filling area may require transport through confined areas or lifts. During movement the potential release of product due to spillage, venting of the open vessel or via the relief valve / burst disc on pressure vessels offers several significant hazards. These are:-

- a) Spillage of cryogenic liquid can cause cold burns, frostbite or hypothermia. Also embrittlement to materials causing failure.
- b) Release of Product can cause a dramatic change in the surrounding atmosphere by gas evolved from the liquid at up to 840 times the liquid volume. Release of Argon or Nitrogen can cause OXYGEN DEFICIENCY and result in asphyxia of personnel in the area. An atmosphere containing less than 18% Oxygen is potentially hazardous and working in atmospheres of less than 20% should be avoided. The release of Oxygen into the atmosphere leads to OXYGEN ENRICHMENT and at levels above 23% the likelihood and potential intensity of a fire is increased. The release of Carbon Dioxide into the atmosphere can result in a TOXIC and OXYGEN DEFICIENT atmosphere and can result in dangerous side effects (refer to data sheet for exposure levels) and asphyxiation.

All cryogenic liquid storage vessels will produce gas as a result of normal heat inleak through the vacuum super insulation and materials of construction. Gas boiled from the liquid will enter the atmosphere from open dewar vessels or pressure relief devices when vapour reaches the set pressure of the device.

In open dewars the volume of gas produced will depend on the condition of the vessel, the state of the liquid and its movement. Additional boiling will occur in "warm" vessels.

Pressure vessels do not vent under normal conditions until pressure reaches the set level of the safety device provided the vessel is well maintained. The burst disc should not rupture unless in a poor condition or failure of the pressure relief valve.

Liquid cylinders and vessels should only be moved on the approved trolley and shall be in a well maintained condition.

Precautions

Where vessels are to be moved between an inside location and the fill area, the vessel must be inspected prior to movement for damage and excess pressure. Where the movement of the vessel

containing product can only be achieved by the use of a lift the following conditions should be applied:-

1. The vessel should be vented to atmosphere using a suitable vent to a safe area until such time as the pressure falls below 60% of the relief valve set pressure. The vessel shall then have all valves closed and its liquid condition checked as stabilised prior to entry into a lift by monitoring the pressure gauge. Open dewars shall be checked for excessive boil-off and the correct neck plug fitted before entry into the lift.
2. Key Controlled lifts should be used where available and the vessels moved between floors unaccompanied. Where the lift is between single floors and not key controlled, the use of additional personnel and / or the use of barriers to prevent entry into the lift with warning notices shall be considered. In some circumstances, particularly where public access is not controlled the operator shall accompany the vessels provided:
 - a) The vessels are in the condition stated in section 1 above.
 - b) The operator has a fully operational Oxygen Monitor in use and control of the lift to enable immediate evacuation at the next available floor in the event of an escape of product
 - c) Additional personnel outside of the lift are trained, aware of the potential hazard and of the action to take in an emergency and the lift is fitted with an emergency alarm / telephone
 - d) No unauthorised personnel are permitted to travel in the lift during transfer of vessels

Filled Vessels

Vessels filled with Cryogenic liquid shall be returned to the point of use following the same criteria above.

DO NOT attempt to move a vessel in a lift or confined area if pressure increase above 60% relief valve set pressure or leaks from any part of the system are evident.

Open dewars once filled to the bottom of the neck shall be allowed to stand until no visible boil-off from the liquid is evident and the correct neck plug shall be fitted.

Risk Assessment

In all cases the risks associated in the movement of the vessel and in particular the use of a lift to accomplish the task should be documented and the risk reduced to the minimum within acceptable and practicable limits.

ADDITIONAL BOC REFERENCES

Data and Safety Sheet

Argon
Nitrogen
Carbon Dioxide
Oxygen

Care with Cryogenics

Prevention of Oxygen Enrichment or Deficiency Accidents

Siting of Liquid Cylinders or Vessels in Buildings

These guidance notes are provided for information, however they do not imply a safe system of work or any liability on behalf of BOC Gases.