

# Gases in General

## T E C H   S P E C S

### CRYOGENIC VESSELS - UTILISATION GUIDELINES

#### **VESSEL:**

The design of the vessel, with its inner and outer aluminium casings, reinforced composite neck, vacuum insulation and multi-layer insulating material, makes it lightweight, highly efficient and rugged even in the most severe operating conditions. However, certain precautions should be taken to increase the life of your vessel:

- avoid impact when placing the vessel on the ground. This operation should be done without dropping or jolting the vessel;
- always store and transport the vessel in an upright position. Avoid tilting the vessel unless necessary;
- always leave the vessel with its plug in place. Prolonged periods with the neck open would cause unnecessary liquid nitrogen losses and inevitably trap air humidity, possibly forming a block of ice in the neck;
- always remove the plug vertically; without friction on the neck so as to avoid excessive wear.

#### **FILLING:**

- 1) The vessel may be filled either by directly pouring liquid nitrogen in through the neck, or by a transfer hose connected to a liquid nitrogen (LIN) storage tank.
- 2) If the vessel still contains some liquid nitrogen, it may be filled completely in one go.
- 3) When filling a hot vessel, pour the liquid in very slowly at the beginning to avoid any liquid being projected out by a strong nitrogen gas current caused by the cooling of the inside of the vessel. Fill the vessel three-quarters full and allow to cool for a few minutes before topping up.
- 4) Avoid spillage of liquid nitrogen onto the top of the tank during filling. If any spillage occurs, check that there are no traces of frosting left on the neck 24 hours later.

NOTE: If using a vessel which is initially hot, full insulation will not be obtained for at least 48 hours.

LIN losses will be high during the first hours and usually above specified levels during the first two days. If maximum autonomy is the objective, then it is worth topping up the LIN level two or three days after initial filling.

#### **CHECKS:**

- 1) To check the residual level of LIN in a vessel.

Certain models are designed essentially for cryobiology applications and are delivered with a plastic dipstick. Remove the plug; fully insert the dipstick; leave in position for 3 to 4 seconds; remove and shake in the air. The mark left by condensation of air humidity shows the level of liquid remaining in the vessel.

- 2) If, following an incident, the vessel is completely frosted over, this shows that the vacuum between the walls has been broken and that the LIN is evaporating very rapidly. If biological products are involved, they must be transferred to another vessel as quickly as possible. If, on the other hand, small areas of frosting are detected, carefully monitor the vessel and LIN consumption over the following days.

- 3) In case of important and rapid damage of performance, the vessel shall immediately be taken out of operation.

### PRECAUTIONS WHEN HANDLING LIQUID NITROGEN

The main benefit of your vessel is that it makes it possible to store a fluid with a very high refrigeration capacity. The fluid in question (LIN) is at a very low temperature (-196°C) and strict regulations must therefore be applied when handling it.

1) Gaseous nitrogen (produced by evaporation of liquid nitrogen) is invisible, odourless and tasteless. It may cause asphyxia by lowering the oxygen content in a poorly ventilated place. Always use and store your nitrogen vessel in a well-ventilated place.

2) Accidental contact with liquid nitrogen may cause cryogenic burns. The liquid must be handled in such a way as to prevent it splashing or flowing. Eye protection should be worn to protect eyes and easy-to-remove gloves to protect operators' hands.

Arms should be covered by long sleeves.

If wearing boots, trousers should not be tucked in.

3) In the event of LIN cryogenic burns, proceed as for frostbite:

- if eyes are affected, wash thoroughly with a plentiful supply of water for fifteen minutes and call a doctor;

- if skin burns are involved, do not rub.

If necessary, remove or loosen garments. Bring the affected parts up to normal temperature by gradual heating, with tepid water if possible, or by placing them against another warm part of the body.

Call a doctor.

4) When not using your vessel, as far as possible avoid emptying it: the LIN will evaporate itself. If you absolutely must empty it, this should be done out of doors in a gravel-filled trench to allow the nitrogen to evaporate quickly and safely.