

DESIGN AND OPERATION OF VEHICLES USED IN MEDICAL OXYGEN HOMECARE DELIVERIES

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Amendments to 128/12

Section	Change
Document	The entire document was updated and partly restructured with new photos.

Note: Technical changes from previous edition are not underlined, as the entire document is updated.

1 Introduction

The delivery of medical oxygen with the associated therapy equipment is made by field personnel using purpose designed delivery vehicles. These guidelines also apply to vehicles operated by subcontractors on behalf of the Homecare Service Providers (HSP). This document describes the basic design principles for the vehicles and safe operation used for the delivery of medical oxygen and associated therapy equipment.

2 Scope and purpose

2.1 Scope

The scope of this document covers

- the design of the vehicles used for the delivery of medical oxygen and related equipment's to the patient, including safety design specifications for the interior
- The operation of the vehicles used for the patient delivery of medical oxygen and related equipment
- The operation of filling of the tank installed inside the vehicle; and
- The operation of filling of the base units at the patient's home.

It specifically does not cover:

- the make, model and size of the vehicle;
- the logistics of the deliveries;
- the carriage of other medical gases with the medical oxygen supplies for homecare use. Where medical gases other than medical oxygen are transported, a risk assessment shall be carried out to consider any additional risks associated with the other medical gases;
- the homecare service provider's operations inside the patient's home or the healthcare facility;
- vehicles used by the patient;
- Transport of Dangerous Goods Regulation 'ADR' [1] requirements, where quantities carried are above the ADR exemption limits for small loads;
- design and operational requirements for the transportable cryogenic tanks, which are covered in EN 1251 [2]; and
- the Good Manufacturing Practice (GMP) [3] requirements for filling and testing the mother tank or for the filling of the base units at either the Homecare Service Provider's premises or at the patient's home.

2.2 Purpose

The purpose of this document is to give guidance on minimum vehicle design and operational safety requirements for the homecare service provider.

3 Definitions

For the purpose of this publication, the following definitions apply.

3.1 Publication terminology

3.1.1 Shall

Indicates that the procedure is mandatory. It is used wherever the criterion for conformance to specific recommendations allows no deviation.

3.1.2 Should

Indicates that a procedure is recommended.

3.1.3 May

Indicates that the procedure is optional.

3.1.4 Will

Is used only to indicate the future, not a degree of requirement.

3.1.5 Can

Indicates a possibility or ability.

3.2 Technical definitions**3.2.1 Homecare Service Provider (HSP)**

An organisation / company that provides the medical oxygen and medical devices for treating patients either in their home or supplied direct to the Healthcare Facility treating the patient.

3.2.2 Healthcare Facility

An organisation / company providing the medical oxygen therapy to the patient on their premises, where they are responsible for the care of the patient.

3.2.3 Transportable Liquid Oxygen System (TLOS)

The base unit and the portable unit that can be filled from the base unit.

3.2.4 Base Unit

A vacuum insulated cryogenic vessels, fitted with an integral vaporiser that can supply medical oxygen to a patient who requires additional oxygen. Unless otherwise designed, the base unit is used to supply the patient with their medical oxygen whilst in the home and holds the principal supply of liquid oxygen for the patient.

3.2.5 Portable Unit

A vacuum insulated cryogenic vessels, fitted with an integral vaporiser that can supply medical oxygen to a patient for ambulatory use. The portable unit can be filled from the base unit by the patient and, unless otherwise designed, used to only supply medical oxygen for ambulatory use.

3.2.6 Transfer Hose

A transfer hose is a flexible hose suitable for cryogenic liquids fitted with medical oxygen specific couplings to connect the base unit to the mother tank or the mother tank with the storage tank for filling purposes only.

3.2.7 Operation

For homecare vehicles refer to the practice of transporting, filling, transfilling and handling the different medical oxygen packages on the road.

3.2.8 Closed maintenance facility

A building used for carrying out maintenance on the vehicle operated by the company or 3rd party owned, with minimal ventilation and standard electrical equipment.

3.2.9 Hot work

Any work requiring brazing, welding, cutting or grinding.

3.2.10 Maintenance of vehicles

Any hot or cold repair to the vehicle's cab or cargo compartment or any automotive maintenance.

3.2.11 Purpose-built Vehicle

Any type of vehicle that has undergone modifications to ensure, as a minimum, efficient ventilation and load security.

3.2.12 Service

The action of installation or removal and replacement, preventative maintenance, repair, technical verification of equipment.

3.2.13 Transfilling

The operation of transferring a cryogenic liquid from a larger tank into a smaller tank via differential pressure.

3.2.14 Mother tank

A transportable cryogenic vessel constructed as a minimum to ADR requirements and with a typical water capacity of between 180 litres and 2000 litres.

3.2.15 Segregation

The separation of cylinders and base units carried on the vehicle to be able to determine its status. The method used to achieve segregation will depend on the nature, extent and complexity of the operation. Marked out floor areas, partitions, barriers and signs could be use.

4 General requirements

Any vehicle and any distribution and transfilling service shall meet all applicable:

- European, national and local regulations,
- ADR Regulations (where they are applicable), and
- the requirements of this document.

The most stringent requirements shall be applicable.

5 Design principles for purpose-built vehicles

The vehicles used by the Homecare Service Provider should be modified to meet the requirements of this document and are referred to hereafter as purpose-built vehicles. The design and operation of these purpose build vehicles shall follow all relevant transport legislation. In addition, there is also specific legislation for the equipment transported; the lifts used for lifting loads and personnel protection and local labour rules.

The scope of this document does not include specifications or considerations on the type of propulsion system or power system (for example CNG, LNG or electric powered vehicles). Any choice on

propulsion system considered should be based on a risk analysis and be compliant with actual ADR regulations.

Following these design principles prevent incidents involving oxygen fires, shown in the images below. The design principles also allow risk minimisation on consequences of collisions and road accidents.





5.1 General specifications

The basic requirements for the design of vehicles used by the Homecare Service Provider are:

- compressed and liquid oxygen shall only be carried in a vehicle with adequate ventilation to avoid a build-up of oxygen;
- the load shall be secured at all times;
- oxygen vessels shall be physically segregated from combustible material;
- full and empty vessels shall be segregated and identified to prevent an empty vessel being supplied for patient use;
- dirty and suspected contaminated vessels shall be also identified and segregated to prevent cross contamination;
- there shall be physical separation between the driver cab and the load carrying compartment;
- the cladding of the Cargo compartment shall use non-combustible materials;
- the vehicle design and material selection for the Cargo compartments shall ensure that the vehicle can be maintained in a clean condition to ensure the hygiene requirements of the equipment being carried, and
- the vehicle design shall ensure that the manual handling aspects of loading and unloading of the vehicle can be carried out safely.

Where the design of the vehicle does not follow the basic principles specified in this document, the alternative design shall be risk assessed to demonstrate that an equivalent degree of safety is obtained.

5.2 Specific requirements

5.2.1 Driver's cab

There shall be a physical separation between the driver's cab and the Cargo compartment to protect the driver from any material projection in the case of emergency braking or road traffic accident.

The physical separation between the driver's cab and the Cargo compartment can be achieved by:

- a bulkhead between the driver's cab and the rear compartment. Fixed windows are permitted in the bulkhead; the bulkhead shall be sealed in case of transportation of medical liquid oxygen;
- an independent rear compartment mounted on a cab chassis; or
- a trailer designed for the purpose.

The bulkhead between the driver's cab and the cargo area shall also be designed to withstand the forces of any loose container or item in the vehicle (identified by risk assessment) moving forward in the event of heavy braking.

Where the cargo is fixed to the bulkhead, it shall withstand forces identified in 5.2.4.

5.2.2 Cargo compartments

Where two or more cargo compartments are used, all of the following requirements shall apply to each of the compartments.

5.2.3 Ventilation

The ventilation of the cargo compartment shall be designed to ensure that any oxygen enrichment of the atmosphere in the compartment is dispersed quickly to keep the oxygen content of the air below 23.5% in normal operation; see EIGA Doc 04 [4].

Cargo compartment containing cylinders or cryogenic liquid vessels shall be equipped with effective ventilation. The setup should ensure a continued ventilation, even when the van is not in use.

Where only compressed gas cylinders are carried, each cargo compartment shall have a minimum of two vents, one at the front near the top of the compartment and one at the rear near the floor. The total free area of the vents shall be at least 600 cm².

Where liquid oxygen is carried in the vehicle, each cargo compartment shall have a minimum of three vents, two at the front near the top of the compartment and one at the rear near the floor. The total free area of the vents shall be at least 900 cm² per compartment carrying oxygen; see CGA Document P-2.6 [5].

Vents shall be of the fixed open type, such as grills, or roof mills.

It shall not be possible to close off these vents and the cargo being carried on the vehicle shall not be allowed to block off the ventilation openings.



Figure 1 Typical ventilation grill at the bottom of the rear door on delivery vehicle

5.2.4 Load security

The HSP should provide the driver with adequate information concerning the safe loading of the vehicle. This information may include details of the maximum number of cylinders or liquid oxygen vessels that may be carried at one time and the distribution of these items within the cargo compartment.

The vehicle manufacturer or vehicle body manufacturer shall be consulted on the requirements for the weight distribution in the vehicle. The maximum loads for the vehicle shall be respected. The loading requirements of the vehicle design can be controlled by restricting the number of storage locations to limit the maximum load on the vehicle.

All loads shall be secured so that the cylinders, liquid vessels or equipment being carried cannot move during normal driving conditions or under harsh braking.

Any modifications to the vehicle shall be designed so that the vehicle can withstand the forces required to secure the maximum intended load in the vehicle under all conditions.

Any securing / anchor points for retaining the load and the associated structure shall be designed to, withstand the forces generated during acceleration or braking in accordance to ADR requirements. If the bulkhead between the driver's cab and the cargo area is used to secure the cargo, it shall be capable of withstanding the same forces.

The bulkhead shall also be designed to withstand the horizontal forces of any loose container or item in the vehicle (identified by risk assessment) moving forward in the event of heavy braking. Gas cylinders or base units may be secured singularly or as a group with a single security system. However, cylinders and base units shall not be secured together. Where more than one container is secured, the system shall be capable of withstanding the forces exerted by the maximum number of containers for which the system is designed.

The method of securing the load under normal driving conditions shall not damage any part of the container or equipment being carried.

Consideration should be given to use straps with protection between the locking fastener and the container walls.

Where cylinders are carried on the vehicle, depending upon their size, they shall be either:

- secured by straps,
- placed in baskets or racks attached to the vehicle, or
- placed in portable racks, secured in the vehicle to prevent them from moving or falling over

If cylinders are transported horizontally, they shall not be able to move inside the compartment during transportation. An example of a cylinder rack is given in Fig. 2.



Figure 2 Typical cylinder storage rack on delivery vehicle