

# INTERNATIONAL STANDARD

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## **Leisure accommodation vehicles — Liquefied petroleum gas systems**

*Véhicules habitables de loisirs — Installations de gaz de pétrole liquéfiés*



Reference number  
ISO 7421:1991(E)

## Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 7421 was prepared by Technical Committee ISO/TC 177, *Caravans*.

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# Leisure accommodation vehicles — Liquefied petroleum gas systems

## 1 Scope

This International Standard specifies requirements with reference to safety for installing liquefied petroleum gas systems and appliances supplied solely from liquefied petroleum gas cylinders, in leisure accommodation vehicles. It does not cover portable appliances or requirements for post-catalytic heaters in which the fuel remixing of gas and air is effected before the catalytic bed is reached; nor does it cover appliances employing after-burners in which the products of incomplete combustion from normal flames are further oxidized over a catalyst. Special requirements for the installation of space heaters in motor caravans are specified in ISO 8377-2.

NOTE 1 This International Standard is one of a series for the habitation aspects of leisure accommodation vehicles.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7418:1989, *Leisure accommodation vehicles — Vocabulary*.

ISO 8377-2:—<sup>1)</sup>, *Motor caravans — Part 2: Installation of oil-fuel-fired and liquefied petroleum gas-fired space heaters*.

1) To be published.

2) The capacity of such cylinders for propane will not exceed 5 kg in the United Kingdom and 2,7 kg in France.

ISO 9227:1990, *Corrosion tests in artificial atmospheres — Salt spray tests*.

## 3 Definitions

For the purposes of this International Standard, the definitions given in ISO 7418 apply.

## 4 Liquefied petroleum gas cylinders

### 4.1 Location of cylinders

Cylinders, whether full or otherwise, shall be located in fuel storage housings, fuel storage compartments or on fuel storage platforms which shall be located so that a cylinder is not outside the body contours of the leisure accommodation vehicle at the sides and rear nor on the roof nor, for a motor caravan, at the front. There shall not be access to a fuel storage compartment from the interior of the leisure accommodation vehicle if the compartment can contain more than one connected cylinder and one unconnected cylinder either of which has a capacity of more than 15 kg<sup>2)</sup>. The cover of any access from the interior of the leisure accommodation vehicle into a fuel storage compartment shall prevent the ingress of vapour into the interior of the leisure accommodation vehicle.

The design of a fuel storage housing or a fuel storage compartment shall permit access to connections and regulating devices and allow replacement of cylinders without disturbance to the installation and ancillary equipment. Where the leisure accommodation vehicle is a road vehicle, cylinders shall be secured in their normal upright position, both when the vehicle is in motion and when it is stationary, on a fuel storage platform, in a fuel storage housing or in a fuel storage compartment. It shall be possible for any cylinder-securing

device to be removed speedily without the use of tools.

## 4.2 Facilities for locations

The following provisions shall be made for fuel storage housings and fuel storage compartments.

### 4.2.1 Ventilation

Permanent ventilation shall be provided to the exterior from a fuel storage housing or a fuel storage compartment. If the ventilation is divided equally between high and low level, the combined free area of ventilation shall be at least 1 % of the floor area of the housing or compartment or 10 000 mm<sup>2</sup>, whichever is the greater. If ventilation is provided only at low level, the free area of ventilation shall be at least 4 % of the floor area of the housing or compartment, or 10 000 mm<sup>2</sup> whichever is the greater. No part of the ventilation area shall be obstructed by a cylinder.

### 4.2.2 Appliances and equipment

No component or fixture that, in normal use, could damage the installation or that might ignite escaping gas shall be installed in a fuel storage housing or a fuel storage compartment.

## 4.3 Operating of cylinders

Cylinders shall be connected to the pipework in an upright position so that they operate only in the gaseous phase. A pressure-reduction system shall be fitted upstream of the appliances and may be of the single-stage or double-stage regulator type. If the pressure-reduction system is mounted remote from the cylinder(s), connection between them shall be by high-pressure hose not exceeding 700 mm in length. It shall be permissible for pressure regulators to incorporate means for over-pressure and/or under-pressure protection. The fixing of the pressure-reduction system shall not be affected by vibration.

## 5 Installation of pipework

### 5.1 General

The bore of piping in an installation shall not be restricted either through bending or cutting.

## 5.2 Materials

### 5.2.1 Pipework material

Pipework shall be of seam-welded steel, seamless steel, stainless steel or copper of suitable physical strength for the application, with a minimum wall thickness of 1 mm.

### 5.2.2 Corrosion protection

Steel pipe shall show no external sign of corrosion after being submitted to a neutral salt spray test for 48 h in accordance with the methods laid down in ISO 9227 for the NSS test.

## 5.3 Joints

Connections shall be made by compression joints, flared type joints, cutting type joints or by fusion of metal. Compression fittings using rubber seals or asymmetrical olives shall not be used. Where cutting rings are used for copper pipes, steel insertion sleeves shall be used. If fusion of metal is used, the melting point of the metal shall not be below 450 °C, except for capillary type fittings using soft solder. Joints shall be accessible and secured, so that they are not affected by vibration.

## 5.4 Fixing

Spacing of fixings shall meet the following requirements:

- a) Copper pipe shall be secured at intervals not exceeding 0,5 m.
- b) Pipes of other materials shall be secured at intervals not exceeding 1,0 m.

## 5.5 Protection against mechanical damage

Pipework shall be protected against mechanical damage (impact, friction or vibration) either by its location or by grommets or other means, where necessary.

## 5.6 Stopcocks

All pipe branches for connections to appliances shall incorporate a stopcock, which shall be readily accessible and easily operated. Unless it is otherwise apparent, the stopcock shall be marked to indicate the appliance it controls and its "off" position.

## 5.7 Connection of appliances

Appliances shall be connected to the gas supply by piping. Low-pressure hose shall be permissible for connecting hotplates and refrigerators that may be

moved from the operating position for storage or travelling. Low-pressure hose shall be of a type approved for such use, its length shall not exceed 1,0 m and a stopcock shall always be fitted on the supply side. The hose shall be protected against mechanical damage and overheating. The hose shall be easily accessible for inspection and shall not pass through or within walls.

## 6 Installation of appliances

### 6.1 General

All appliances shall be installed in accordance with the appliance manufacturers' instructions and be fixed in a secure manner, when either in the operating or travelling position, so as not to cause a hazard.

### 6.2 Flame failure

A flame failure device shall be fitted to appliances designed for continuous operation, appliances incorporating a pilot flame and appliances with automatic control over a burner.

NOTE 2 In certain countries, all appliances are required to be fitted with a flame failure device.

### 6.3 Space heaters

Special requirements for space heaters in motor caravans are specified in ISO 8377-2. In other types of leisure accommodation vehicle, space heaters shall be of the room-sealed type, but flued space heaters with open combustion chamber shall be permissible for leisure homes. The products of combustion shall be ducted to the outside of the leisure accommodation vehicle by means of a flue (see 7.1).

### 6.4 Water heaters

The products of combustion from water heaters shall be ducted to the outside of the leisure accommodation vehicle by means of a flue. It shall not be necessary for an instantaneous water heater to comply with the requirements for flues, providing its power output does not exceed 8,7 kW, it is fitted with an atmosphere-sensing device, it is not capable of being connected to water mains supply and it serves only a sink or wash-basin. A warning shall be included in the Users' Handbook against the misuse of such heaters for other purposes, especially showers.

NOTE 3 In Germany, water heaters are required to be room-sealed or installed in a room-sealed enclosure.

## 6.5 Refrigerators

The products of combustion from refrigerators shall be ducted to the outside of the leisure accommodation vehicle, the necessary assembly for this purpose being as supplied or as recommended by the appliance manufacturers and installed in accordance with their instructions.

## 7 Flues

### 7.1 Flue pipes

A flue pipe shall be continuous between an appliance or a draught diverter and a flue terminal. Except where a draught diverter is fitted, the joints between a flue pipe and an appliance and between a flue pipe and a flue terminal, if fitted, shall be sealed to prevent the products of combustion entering a leisure accommodation vehicle. The whole flue assembly shall be as supplied or as recommended by the appliance manufacturers and shall be installed in accordance with their instructions. The whole assembly shall remain firmly in position even when the leisure accommodation vehicle is in motion.

### 7.2 Flue terminals

Flue terminals shall be sited in accordance with the appliance manufacturer's instructions. Where the flue of an appliance is designed to discharge through the floor of a leisure accommodation vehicle, the terminal shall be positioned at least 1 m from any ventilation opening in the floor and from any fitted in a fuel storage compartment. No two ventilation openings shall be positioned in the same area of floor that is divided into distinct parts by, for example, chassis members or floor bearers that project below the floor.

No terminal of a flue that passes through a wall or a roof shall be fitted within 300 mm of a ventilator or an opening part of a window, or within 500 mm of any ventilator from the fuel system(s). In a motor caravan, no flue terminal shall be within 500 mm of its refuelling point or fuel tank breather outlet. Where the flue terminal of an appliance is positioned below an opening part of a window, a warning notice shall be fixed in a prominent position internally adjacent to the window stating that it should not be opened when the appliance is in operation.

### 7.3 Weather protection

Where a flue pipe passes through a wall or roof, measures shall be taken to prevent ingress of rain. In these cases, the flue terminal shall be fitted with a weather cap, so designed as not to obstruct the emission of flue gases.

#### 7.4 Draught diverters and dampers

Where a draught diverter is fitted, it shall be integral with an appliance or immediately adjacent to it. No additional draught diverter nor damper that restricts the area of a flue shall be fitted.

#### 7.5 Accessibility of flues

Means shall be provided to allow periodic inspection of the whole of the circumference and length of un-insulated flue pipes, or the flue ends and attachments and the whole of the outside of the insulating sleeve of insulated flue pipes. Panels or structure shall be removable by means of a simple tool such as a screwdriver. It shall be permissible to carry out an inspection by the use of a hand-held mirror or by feel as an acceptable alternative to direct visual inspection.

### 8 Heat-generating appliances and equipment

#### 8.1 Curtains and blinds

Curtains and blinds shall not be nearer than 300 mm to an open flame of any appliance.

#### 8.2 Boiling burners

In the case of open flame boiling burners, the following requirements shall be met:

- a) the surface below the burners shall be metallic or covered by a non-combustible material;
- b) where there is a cover for the appliance which is likely to come into contact with the pan supports, either the inner lining of that cover shall be of non-combustible material or a movable metal guard shall be provided.

#### 8.3 Protection of adjacent surfaces

Protection of surfaces adjacent to heat-generating appliances shall be achieved by ensuring that any heat-generating appliance to be fitted in a leisure accommodation vehicle shall be certified by an approved body as complying with appropriate national, regional or International Standards with regard to

safety and relevant installation requirements. Such appliances shall only be installed in accordance with the manufacturers' instructions.

### 9 Inspection and testing

#### 9.1 Testing of installation

The complete installation shall be tested by air pressure for absence of leaks, from the supply inlet to the appliance taps.

#### 9.2 Test pressure and compliance

The test pressure shall be twice the maximum working pressure. If sections of the pipework are under different service pressures, each section shall be pressure-tested separately. The test shall be considered satisfactory if, after attaining temperature equilibrium, the pressure remains constant for a period of 5 min.

#### 9.3 Testing of appliances

All appliances shall be inspected to ensure correct operation.

#### 9.4 Test certificate

A certificate stating that the tests in this clause have been satisfactorily carried out shall be issued by the manufacturer or authorized installer.

### 10 Operating Instructions

#### 10.1 Instructions on use

With each new leisure accommodation vehicle, the manufacturer shall provide instructions for the correct operation, regular periodic inspection and maintenance of the system, which shall be included as part of the Users' Handbook.

#### 10.2 Gas type and pressure

A plate shall be fixed adjacent to the location of the cylinder(s), giving details of the types of gas and working pressure for which the installation is suitable.