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Leisure accommodation vehicles — Ventilation requirements

Véhicules habitables de loisirs — Exigences de ventilation

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 7419 was prepared by Technical Committee ISO/TC 177, *Caravans*.

This second edition cancels and replaces the first edition (ISO 7419:1984), of which it constitutes a technical revision.

Annex A forms an integral part of this International Standard.

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Leisure accommodation vehicles — Ventilation requirements

1 Scope

This International Standard specifies the minimum natural ventilation requirements for leisure accommodation vehicles. It provides a test method, the results of which establish the maximum permissible level of the CO_2 content of the atmosphere in living compartments of the leisure accommodation vehicles. It specifies fixed free areas, or a calculation method for them, to provide sufficient ventilation that will ensure this level is not exceeded. Additional special requirements for motor caravans are given in ISO 8377-1[1].

The test method included in the annex is a means of verifying the adequacy of the system of ventilation provided, giving a means of assessing its efficiency by national legislative authorities or other third parties to ensure compliance with this International Standard. It applies only to ventilation provided by the natural movement of air through fixed ventilators. It takes account of liquefied petroleum gas appliances and oil-fired heating appliances that may be installed, the latter requiring additional ventilation in accordance with ISO 7420.

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 7420:1987, *Leisure accommodation vehicles — Oil-fired heating systems.*

ISO 7421:1991, *Leisure accommodation vehicles — Liquefied petroleum gas systems.*

3 Definitions

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

4 Level of air purity

The carbon dioxide (CO_2) content of the air within a living compartment of a leisure accommodation vehicle shall not exceed 1 %, when tested in accordance with annex A, over the background level.

5 Fixed natural ventilation

5.1 Main ventilation

The total effective fixed free area of ventilation to comply with the requirements of clause 4 shall not be less than either

— the sum of the calculated values given in column A of table 1, or

— the sum of the fixed values given in column B of table 1

at the discretion of the manufacturer.

1) ISO 8377-1, *Leisure accommodation vehicles — Motor caravans — Part 1: Habitation requirements* (to be published).

Table 1 — Ventilation areas

Function	A Calculated areas mm²	B Fixed areas mm²	
		high	low
a) Renewal of air for occupants	650 × P	2 000	1 000
b) Evacuation of combustion products from flueless appliances	2 200 × U	15 000[1)]	
c) Combustion air for flued appliances not room sealed	440 × F		10 000

where

P is the number of occupants, (in the case of compartments available for sleeping, the number of berths, both standard and optional);

U is the power in kilowatts of all flueless appliances;

F is the power in kilowatts of all flued appliances that are not room sealed.

1) This area of ventilation shall be located above the appliances. If the ventilation is provided by means of a rooflight, it shall be permissible to reduce the free area remaining when the rooflight is closed to 10 000.

5.2 Application of ventilation areas

The areas selected from 5.1 shall be applied to any part of the leisure accommodation vehicle that is a separate living compartment, other than:

a) a toilet compartment (see 5.6);

b) a compartment resulting from temporary division by a curtain.

5.3 Air for occupants

Each separate living compartment shall be provided with ventilation openings at high level and low level to renew air for occupants, with free areas in accordance with a), column A or B, in table 1.

5.4 Provisions for liquefied petroleum gas and oil-fired heating appliances

In addition to the free area of ventilation provided in accordance with 5.3, when liquefied petroleum gas appliances or oil-fired heating appliances are installed, additional free areas of ventilation shall be provided in accordance with b) and c), of column A or B, in table 1.

5.5 Distribution of ventilation

5.5.1 Calculated areas

When the total free area of ventilation is provided in accordance with column A of table 1 (i.e. by calculation), the free area at high level and low level shall, at each level, be not less than 50 % of the total calculated area.

5.5.2 Cross-ventilation

If more than two high-level openings and more than two low-level openings are provided, they shall be distributed around the compartment to provide cross-ventilation.

5.6 Toilet compartment

A minimum total effective fixed free area of ventilation of 2 000 mm² shall be provided in a toilet compartment, distributed equally between high level and low level.

It is recommended that adjustable ventilation should be provided in addition to the fixed ventilation.

5.7 Air for combustion

Additional air for combustion when oil-fired heating appliances are installed shall be in accordance with the requirements of ISO 7420.

6 Verification

When required by a national Authority or other third party, the efficiency of a fixed ventilation system shall be verified by the test method in annex A. At least one model from the manufacturer's range being assessed shall be verified and, if it meets the requirement of clause 4, other models in the range using the same ventilation system shall be deemed to be acceptable.

Natural ventilation systems are considered to be the same when:

a) the total effective fixed free areas of ventilation provided in accordance with 5.1 are identical; and

b) the ventilators operate on the same principle and are in the same positions.

7 Design

Fixed ventilation should be designed to avoid draughts as far as possible, even in unfavourable weather conditions, without reducing the full free area of ventilation.

7.1 Location of ventilation openings

Ventilation openings provided for the extraction of products of combustion shall be positioned as high as possible and those provided for the intake of air shall be positioned as low as possible. These requirements shall be considered to have been complied with if the openings are not more than 100 mm from the roof or floors of the compartment respectively.

7.2 Ingress of fumes

No low-level ventilation opening shall be positioned within 300 mm of an opening for the extraction of products of combustion.

7.3 Avoidance of obstructions

All ventilation openings shall be positioned so that they cannot be made ineffective by drapes, curtains or other obstructions.

Ventilation openings shall provide ventilation directly to or from the exterior of the leisure accommodation vehicle, or shall provide it indirectly. If the ventilation is provided indirectly to the interior through a cupboard, bed box or similar space, it shall not be possible for the passage of air from the exterior to be obstructed, particularly accidentally by items stored in those spaces.

7.4 Ventilator screens

Fixed ventilation openings shall be designed to prevent the entry of vermin and shall be protected by a grille or screen that shall be easily accessible for cleaning.

7.5 Siting of mechanical ventilation

Extraction or forced air ventilators shall not be located so that there is a risk of products of combustion from a flue outlet being drawn into a living compartment.

Special care should be taken in the installation of mechanical ventilation, as it can have adverse effects on the efficacy of a natural ventilation system.

8 Advice to users

Attention shall be drawn in the Users' Handbook to the following:

a) that fixed ventilation openings should in no circumstances be obstructed, even partially;

b) the location of fixed ventilation openings and the need to keep screens or grilles clean and free from dust;

c) that appliances with a naked flame should not be used for heating.

Annex A
(normative)

Test method for natural ventilation system

A.1 Preparation

A.1.1 Carry out the test in a calm atmosphere, preferably indoors, with an ambient temperature outside the vehicle of between 10 °C and 25 °C.

A.1.2 Where the test is carried out indoors, measure the level of CO_2 pollution in the test area and allow for it in the test results.

A.1.3 Shut windows, doors and all closable ventilators during the entire test period. Close adjustable ventilators to their minimum position. Hermetically seal the passage of the measuring line, if necessary.

A.1.4 Switch off all mechanical ventilation systems.

A.2 Test method

A.2.1 Test all designated compartments concurrently.

A.2.2 Light and set to maximum setting the refrigerator, if fitted, and any other non-room-sealed appliance except cooking appliances.

A.2.3 To simulate occupation of the compartments, and to introduce a safety factor to cover possible extra occupants or the extended use of an unattended cooking appliance burner or other naked flame, introduce a CO_2-producing device in the form of a burner or burners fuelled by LPG and calibrated as follows:

$$\text{Output in kilowatts} = 1{,}5 + (0{,}1 \times P)$$

where P is the number of occupants (in the case of compartments available for sleeping, the number of berths, both standard and optional).

A.2.4 Locate the CO_2-producing device, specified in A.2.3, approximately 200 mm above the floor level and take samples of the atmosphere approximately 200 mm below the ceiling at about the centre of the compartment and where a ventilation opening is not likely to be an undue influence.

A.3 Test cycle

A.3.1 Take the first sample after 20 min. Take subsequent samples at intervals of no less than 5 min and not more than 15 min. Take the final sample after not more than 60 min. Consider the test completed at 60 min or when sampling reveals that the CO_2 level has become constant, whichever is the earlier.

A.3.2 If the test is interrupted for any reason, such as the opening of a door or the involuntary extinguishing of a burner, abandon the test and begin a new test cycle after a period of at least 1 h.

A.4 Test result

Consider the test result satisfactory if the CO_2 level does not exceed 1 %, in accordance with the requirement in clause 4.

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