TC 188

INTERNATIONAL STANDARD

ISO 11105

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Small craft — Ventilation of petrol engine and/or petrol tank compartments

Navires de plaisance — Ventilation des compartiments moteur à essence et/ou réservoir à essence

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Reference number
ISO 11105:1995(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 11105 was prepared by Technical Committee ISO/TC 188, *Small craft.*

Annex A of this International Standard is for information only.

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Small craft — Ventilation of petrol engine and/or petrol tank compartments

1 Scope

This International Standard specifies requirements for ventilation of petrol engine and petrol tank compartments in small craft of up to 24 m length of hull, having petrol engines for propulsion, electrical generation or mechanical power, to prevent accumulation of explosive gases in these compartments. Personal watercraft are not covered.

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 8846:1990, *Small craft — Electrical devices — Protection against ignition of surrounding flammable gases.*

ISO 9097:1991, *Small craft — Electric fans.*

ISO 11192:—[1], *Small craft — Graphical symbols.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 open to atmosphere: Compartment or space having at least 0,34 m^2 of permanent open area directly exposed to the atmosphere for each cubic metre of net compartment volume.

3.2 separation bulkhead: Bulkhead which prohibits circulation of liquid petrol or petrol vapours between two compartments.

4 General requirements

4.1 Natural ventilation shall be provided in petrol engine and petrol tank compartments in accordance with clause 5.

4.2 Powered ventilation shall be provided in petrol engine compartments in accordance with clause 6.

4.3 The ventilation duct sizes and airflow requirements shall be calculated based on compartment volumes.

4.3.1 The volumes of adjacent compartments shall be included in this calculation, if the aggregate area of the openings in the separation bulkheads exceeds 1 % of the separation bulkhead between these compartments.

4.3.2 The separation bulkhead area used for the calculations in 4.3.1 shall be calculated using a height which is the lesser of the distance between the bottom and top of the bulkhead between the compartments, or 750 mm.

4.4 The bulkhead, below the height referred to in 4.3.2, shall have no openings, except for one limberhole in the drainage location(s), not exceeding 500 mm^2, to any adjacent compartment.

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4.5 No ventilation is required in petrol engine or petrol tank compartments which are open to the atmosphere as defined in 3.1.

4.6 Neither supply nor exhaust ducts shall open into an accommodation space.

4.7 Electrical components installed in petrol engine and petrol tank compartments and any connecting compartments, not open to the atmosphere, shall be ignition-protected in accordance with ISO 8846.

5 Natural ventilation systems

5.1 Unless open to the atmosphere, each compartment in a craft shall have a natural ventilation system if

— it contains a permanently installed petrol engine; or

— it contains a permanently installed petrol tank and an electrical component other than the petrol level gauge sending unit; or

— it is designated to contain a portable petrol tank.

5.2 Natural ventilation shall be achieved by an airflow in a compartment by the following:

— a supply opening or duct from the atmosphere; and

— an exhaust opening or duct to the atmosphere.

Each exhaust opening or exhaust duct shall originate in the lower one-third of the compartment.

Each supply opening or supply duct and each exhaust opening or exhaust duct in a compartment shall be above the normal accumulation of bilge water.

Compartment air intake and exhaust duct openings shall be separated by at least 600 mm, compartment dimensions permitting.

5.3 Except as provided in 5.4, the combined area of supply openings or supply ducts, and the combined area of exhaust openings or exhaust ducts shall have a minimum internal cross-sectional area calculated as follows:

$$A = 3\,300 \ln(V/0{,}14)$$

where

A is the minimum combined internal cross-sectional area of the openings or ducts, in square millimetres;

V is the net compartment volume equal to the total compartment volume minus the volume of permanently installed components in it, in cubic metres.

A corresponding graph is given in figure 1.

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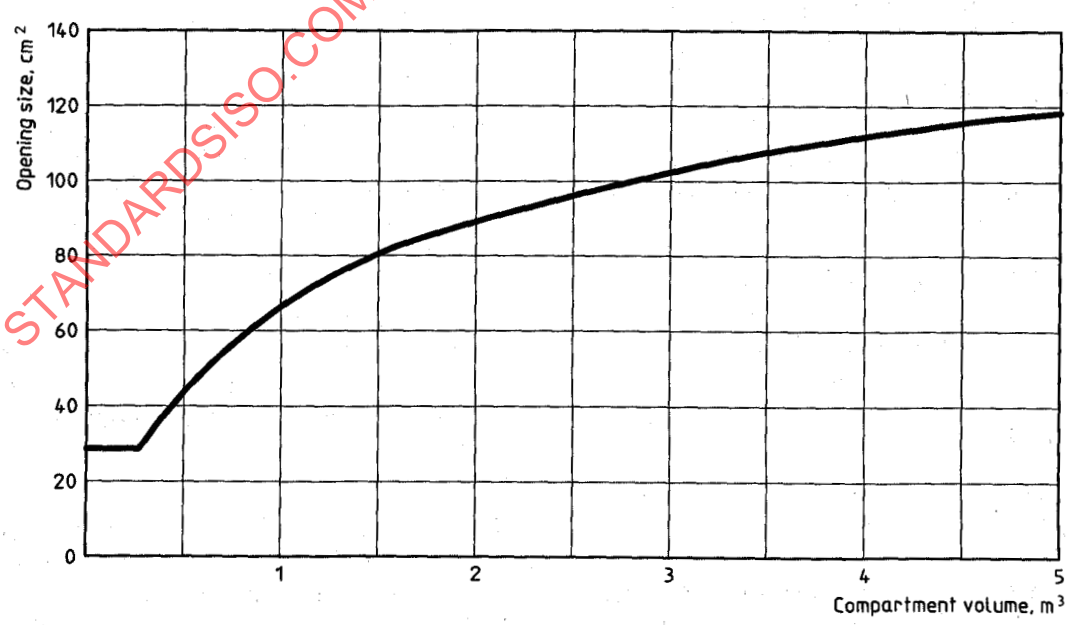

Figure 1 — Natural ventilation opening size

5.4 The minimum internal cross-sectional area of each supply opening or duct, and exhaust opening or duct shall exceed 3 000 mm^2.

5.5 The minimum internal cross-sectional area of terminal fittings for flexible ventilation ducts installed to meet the requirements of 5.3 shall not be less than 80 % of the required internal cross-sectional area of the flexible ventilation duct.

5.6 The exhaust of the natural ventilation system may be part of the powered ventilation system.

6 Powered ventilation systems

6.1 Unless open to the atmosphere, each compartment containing a permanently installed petrol engine shall be ventilated by removing air from the compartment to the atmosphere outside the craft by an exhaust blower system.

6.2 Each exhaust blower or combination of blowers shall be rated at an airflow capacity q_r not less than that given in table 1. Blower rating shall be determined according to ISO 9097.

Table 1

V m^3	q_r m^3/min
< 1	1,5
$1 \leqslant V \leqslant 3$	$1,5 \times V$
> 3	$0,5 \times V + 3$

A corresponding graph is given in figure 2.

6.3 Each intake duct for an exhaust blower shall be in the lower one-third of the compartment and above the normal level of accumulated bilge water.

6.4 More than one exhaust blower may be used in combination to meet the requirements of clause 6.

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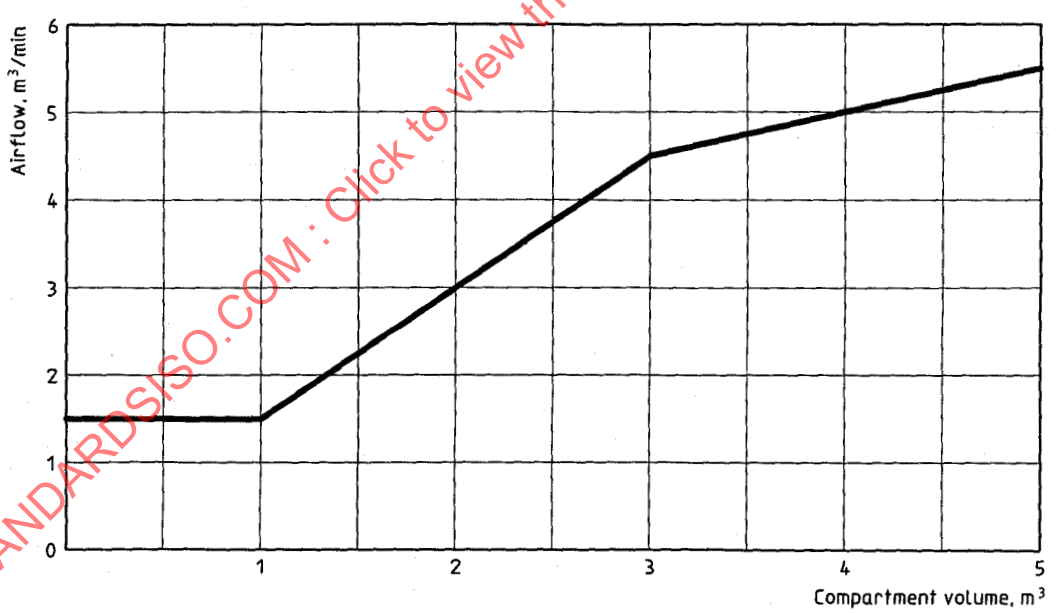

Figure 2 — Powered ventilation blower capacity

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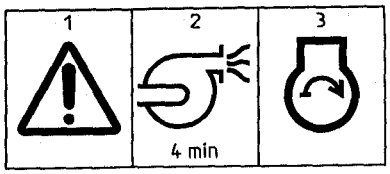
6.5 Each craft that is required to have an exhaust blower shall have a label that

— is located as close as practicable to each ignition switch;

— is in plain view of the operator;

— has the symbols in accordance with ISO 11192, depicted in figure 3, or at least the following information in a language acceptable in the country of sale:

WARNING — Operate blower for 4 min before starting engine.



NOTE — "4 min" shall be at least 5 mm high.

Figure 3 — Symbols

7 Owner's manual

The following information should be included in the owner's manual:

— explanation of symbols;

— the statement "Do not obstruct or modify the ventilation system".

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Annex A
(informative)

Bibliography

This International Standard is intended to provide protection against explosion and fires. It is important to realize that this Standard by itself is not intended to achieve this purpose. The manufacturer also needs to comply with additional Standards related to protection against the same possible hazards. These additional Standards are listed below, with a brief description of their contents. For complete understanding of the requirements, the manufacturer needs to refer to the actual Standard. Compliance with all these International Standards will ensure a high level of safety in all craft, particularly in those using petrol or LPG.

[1] ISO 10088:1992, *Small craft — Permanently installed fuel systems and fixed fuel tanks*

Individual fuel tanks, 100 % pressure-tested.

Non-metallic fuel tanks, fire-tested.

Fire-resistant flexible fuel hoses.

Fire test for non-metallic fuel system components.

Corrosion-resistant fuel tank materials.

Galvanically compatible metallic parts.

Anti-siphon protection requirements.

Double clamping of fuel fill hoses.

Electrically ground major metallic parts.

100 % pressure test of entire fuel system.

[2] ISO 10133:1994, *Small craft — Electrical systems — Extra-low-voltage d.c. installations*

All components fused.

All conductors insulated.

All electrical components installed in bilges or other compartments that may contain explosive gas are ignition-protected.

Installation requirements for batteries and cables.

Requirements for ring or captive spade terminals on conductor connectors.

[3] ISO 8846:1990, *Small craft — Electrical devices — Protection against ignition of surrounding flammable gases*

All components in petrol engines, petrol and LPG tank compartments to be ignition-protected to prevent open sparks. This applies to the entire engine, as well as all electrical contacts, commutators, brushes, collector rings, switches, relays, generators, fuses, distributors, engine-cranking motors, propulsion trim motors, etc.

The Standard further requires components to withstand any operating conditions of the device, including the maximum achievable overload up to 400 % of the rated current (circuit-breakers, switches and the like) and a stalled rotor condition for any motor with the circuit protected in an overcurrent protective device specified by the product manufacturer.

[4] ISO 7840:1994, *Small craft — Fire-resistant fuel hoses*

Only fire-resistant fuel hoses may be used in petrol engine and petrol fuel tank compartments. A flexible hose to be used between the engine and any solidly mounted metallic line to eliminate vibration failure. The hose to withstand fire, pressure, vacuum collapse, ozone and other environments, and have minimal fuel permeation.

[5] ISO 9097:1991, *Small craft — Electric fans*

[6] ISO 8849:1990, *Small craft — Electrically operated bilge-pumps*

All components, if installed in the petrol engine or petrol tank compartment need to be ignition-protected, have all wiring insulated, be suitable for a marine environment, and not create a hazard when the motor is overloaded or stalled.

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[7] ISO 10239:—[2], *Small craft — Liquefied petroleum gas (LPG) systems*

System to withstand temperature extremes.

Appliances approved and installed only in ventilated compartments, tanks and pressure regulators in lockers identified and vented with overboard drains.

Meet specifications for fuel lines and their supports.

Appliance well secured with flame failure shutoff control device for each appliance.

Warning labels on appliances.

Pressure test on installed system.

Any electrical device in lockers, designated for LPG storage, ignition-protected.

[8] ISO 9094-1:—[2], *Small craft — Fire protection — Part 1: Craft with a hull length of up to and including 15 m*

NOTE 1 A future part 2 will cover small craft of up to 24 m.

Specifications for exits and emergency exits.

Material specifications in areas close to open flames.

Self-extinguishing materials in engine compartment.

Ventilation and flue protection for water heater.

Sealed combustion systems on unattended appliances.

Specification for fuel tanks.

Requirement for portable fire-extinguishers, for accessibility, protection, stowage and locker identification size.

Specification for number and types of fire-extinguishers.

Specification for fixed fire-extinguishing system on some craft.

Cylinder installation specification.

Remote release for fixed systems.

Distribution hoses and tubes fire-resistant.

Specifications for discharge and control.

Discharge and operating instructions.

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