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Small craft — Permanently installed fuel systems

Petits navires — Systèmes à carburant installés à demeure

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 188, *Small craf*t, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 464, *Small Craft*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fifth edition cancels and replaces the fourth edition (ISO 10088:2013), which has been technically revised.

The main changes are as follows:

— pressure testing requirement updated in Annex A;

— permeation test limits and test procedures added as a new informative Annex B to serve as a reference for evaporative emissions.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

This document deals with the installed fuel system as a whole. Fire resistant hoses, non-fire resistant hoses and permanently installed petrol and diesel fuel tanks are dealt with by ISO 7840:2021, ISO 8469:2021 and ISO 21487:2022, respectively. These standards are applicable to these products supplied as components.

Some countries have environmental controls for evaporative emissions from petrol fuel systems, and this document includes an informative Annex B describing limits and test procedures for the control of evaporative emissions from permanently installed petrol fuel systems. The details in Annex B allow for future standardization and application of evaporative emissions on small craft.

As the international community further restricts fuel system emissions, it is anticipated that Annex B will have increased global acceptance.

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Small craft — Permanently installed fuel systems

1 Scope

This document specifies the requirements for the design, materials, construction, installation and testing of permanently installed fuel systems as installed for internal combustion engines.

It applies to all parts of permanently installed diesel and petrol fuel systems as installed, from the fuel fill opening to the point of connection with the propulsion or auxiliary engine(s) on inboard- and outboard-powered small craft.

Requirements for the design and testing of petrol and diesel fuel tanks for internal combustion engines that are intended to be permanently installed in small craft are given in ISO 21487:2022.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1817:2022, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 7840:2021, *Small craft — Fire-resistant fuel hoses*

ISO 8469:2021, *Small craft — Non-fire-resistant fuel hoses*

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

ISO 11105:2020, *Small craft — Ventilation of petrol engine and/or petrol tank compartments*

ISO 11192:2005, *Small craft — Graphical symbols*

ISO 13297:2020, *Small craft — Electrical systems — Alternating and direct current installations*

ISO 13297:2020/Amd 1:2022, *Small craft — Electrical systems — Alternating and direct current installations — Amendment 1*

ISO 21487:2022, *Small craft — Permanently installed petrol and diesel fuel tanks*

IEC 60068-2-52:2017, *Environmental testing — Part 2-52: Tests — Test Kb: Salt, cyclic (sodium chloride solution)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

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3.1
accessible
capable of being reached for inspection, removal or maintenance without removal of permanent craft structure

Note 1 to entry: Hatches are not regarded as permanent craft structures in this sense, even if tools such as wrenches or screwdrivers are needed to open them. Hatches for inspection or maintenance of fuel tanks are permitted to be covered by uncut carpet, provided that all tank fittings can be inspected and maintained through other openings.

3.2
readily accessible
capable of being reached quickly and safely for maintenance or effective use under emergency conditions without the use of tools

3.3
permanently installed
securely fastened so that tools are required for removal

3.4
anti-siphon valve
demand valve that can be opened only by fuel pump suction to withdraw fuel from a tank and that remains closed when the fuel pump is not operating, preventing siphon action created by a break or leakage at any point in the fuel distribution system

3.5
static floating position
condition in which the craft floats in calm fresh water according to light craft mass m_{LC} with each fuel tank filled to rated capacity but excluding all non-permanently attached interior and exterior equipment

Note 1 to entry: The light craft mass m_{LC} is specified in ISO 8666:2020, 6.3.

3.6
petrol
hydrocarbon fuel, or blend thereof, that is liquid at atmospheric pressure and is used in spark-ignition engines

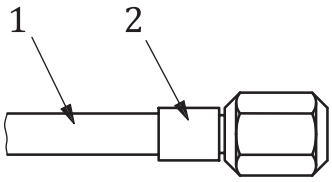
3.7
diesel
hydrocarbon fuel, or blend thereof, that is liquid at atmospheric pressure and is used in compression-ignition engines

3.8
spud
rigid pipe or spigot used for the connection of pipes and hoses to tanks or components such as filters and pumps

3.9
swaged sleeve
permanently attached fuel hose end fitting obtained by applying even compression to a metal sleeve or ferrule, sufficient to make the inner lining of the hose take up the shape of the insert and create a pressure seal

Note 1 to entry: See Figure 1.

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Key

1 hose

2 sleeve

Figure 1 — Swaged sleeve

3.10
sleeve and threaded insert
permanently attached fuel hose end fitting made by screwing an insert sleeve with threads into the hose and applying even compression to a metal sleeve or ring to secure the hose in place

Note 1 to entry: This type of connection can be made with the sleeve placed on the outside of the hose and then screwing the threaded insert into the inner lining.

3.11
compartment
cabin or enclosure able to be closed to the outside of the craft

Note 1 to entry: Multiple compartments can be joined together as long as the total volume is closed to the outside of the craft.

3.12
craft's ground
ground that is established by a conducting connection (intended or accidental) with the common ground (potential of the earth's surface), including any conductive part of the wetted surface of the hull

Note 1 to entry: "Ground" is also known as "earth".

3.13
craft
small craft
recreational boat and other watercraft using similar equipment, of up to 24 m length of hull (L_H)

Note 1 to entry: The measurement methodology for length of hull is defined in ISO 8666.

[SOURCE: ISO 8666:2020, 3.15, modified — Note 1 to entry has been added.]

3.14
entering the craft
event in which liquids or fumes enter the interior space of the craft

3.15
evaporative emissions
fuel emissions that result from permeation of fuel through the fuel system materials or from ventilation of the fuel system

3.16
diurnal emissions
evaporative emissions (3.15) that occur as a result of venting fuel tank vapours during daily temperature changes while the engine is not operating

3.17
emissions class 1 craft
craft under 8 m in length or under 2,6 m beam

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3.18
emissions class 2 craft
craft greater than or equal to 8 m in length or greater than or equal to 2,6 m beam

3.19
SHED
sealed housing evaporative determination enclosure

3.20
carbon canister
container with activated carbon to absorb hydrocarbon vapours from the fuel system

3.21
heeled waterline
level of the water on the hull in the fully loaded ready-for-use m_{LDC} condition when the craft is inclined to

— 7° for motor boats and sailing multihulls; or

— 30° or immersion of the sheerline, whichever occurs first, for monohull sailing boats

Note 1 to entry: The fully loaded ready-for-use condition is defined in ISO 8666:2020, 7.3.

[SOURCE: ISO 9093:2020, 3.6]

4 General requirements

4.1 Materials and design

4.1.1 Individual components of the fuel system, and the fuel system as a whole, shall be designed to withstand the combined conditions of pressure, vibration, shocks, corrosion and movement encountered under normal operating conditions and storage of the craft.

4.1.2 Each component of the fuel system, and the fuel system as a whole, shall be capable of operation within an ambient temperature range of − 40 °C to + 80 °C, without failure or leakage.

NOTE Thermoplastic tanks and components can be affected by high return fuel temperature. It is therefore important to read the engine installation manual for information.

4.1.3 All materials used in the fuel system shall be resistant to deterioration by its designated fuel and to other liquids or compounds with which it may come into contact under normal operating conditions, e.g. grease, lubricating oil, bilge solvents and sea water.

4.1.4 Petrol engine compartments, petrol tank compartments and compartments with joints or fittings in fuel lines connecting spark-ignition engines with their fuel tanks shall have ventilation and ignition protection in accordance with ISO 11105:2020 and ISO 8846:1990.

4.1.5 The only outlets for drawing fuel from the fuel system shall be

— plugs in petrol filter bowls intended solely for the purpose of servicing the filter;

— plugs or valves in diesel filter bowls intended solely for the purpose of servicing the filter.

NOTE Tank openings are covered by ISO 21487:2022.

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