INTERNATIONAL STANDARD

ISO 9094

Second edition
2022-11

Small craft — Fire protection

Petits navires — Protection contre l'incendie

Reference number
ISO 9094:2022(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 88, *Small craft*, 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 second edition cancels and replaces the first edition (ISO 9094:2015), which has been technically revised.

The main changes are as follows:

— the "engine compartment" definition (3.3) has been updated;

— the "fire resistant" definition (3.21) has been added;

— the pitch angle up to 15° for all craft to prevent cooking devices from sliding off the stove, in 4.1.1, has been updated;

— the pitch and heel angles in 4.2.1 have been updated;

— the requirements for protection from open flame in 4.2.2 have been updated;

— Table 1 to expand the understanding of zone protection has been updated;

— a clarification for fire escape routes in 6.1 has been added;

— Table 2, "Protection of the engine(s) and engine compartments", has been updated;

— the requirements for portable fire extinguisher locations have been updated (see 7.5);

— the asphyxiant medium from fixed fire extinguishing systems has been removed (see 7.6);

— Clause 8, "Displayed information", has been updated;

— the Bibliography has been updated.

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.

Introduction

This document covers the prevention of fire and the protection of life in case of fire on small craft.

It is intended to ensure that the design and layout of the craft and the type of equipment installed minimize the risk and spread of fire and that every habitable craft is provided with viable means of escape in the event of fire.

The requirements in this document may not be effective against fires of some battery chemistries (for example lithium-based products). Battery manufacturers should be consulted for appropriate methods of fire suppression.

Small craft — Fire protection

1 Scope

This document defines a practical degree of fire prevention and protection intended to provide enough time for occupants to escape a fire on board small craft.

It applies to small craft having a length of the hull (L_H) of up to 24 m except for personal watercraft.

This document does not cover:

— the design and installation of permanently installed galley stoves and heating appliances (including components used to distribute the heat) using fuels that are liquid at atmospheric pressure on small craft, which are covered by ISO 14895:2016;

— carbon monoxide detecting systems, which are covered by ISO 12133.

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 4589-3:2017, *Plastics — Determination of burning behaviour by oxygen index — Part 3: Elevated-temperature test*

ISO 7165:2017, *Fire fighting — Portable fire extinguishers — Performance and construction*

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

ISO 10088, *Small craft — Permanently installed fuel systems*

ISO 10239:2014, *Small craft — Liquefied petroleum gas (LPG) systems*

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

ISO 12216, *Small craft — Windows, portlights, hatches, deadlights and doors — Strength and watertightness requirements*

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

ISO 14895:2016, *Small craft — Liquid-fuelled galley stoves and heating appliances*

ISO 16315, *Small craft — Electric propulsion system*

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

IEC 60092-507:2014, *Electrical installations in ships — Part 507: Small vessels*

EN 3-7:2004+A1:2007, *Portable fire extinguishers – Part 7: Characteristics, performance requirements and test methods*

EN 1869:2019, *Fire blankets*

EN 15609:2021, *LPG equipment and accessories — LPG propulsion systems for boats, yachts and other craft*

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/

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 are needed to open them.

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

3.3
engine compartment
compartment of the craft, containing spark or compression ignition internal combustion engine(s)

3.4
fixed fire extinguishing system
fixed system
fire-fighting system having all components fixed in position and having automatic activation and/or manual release from outside of the space protected

3.5
fire exit
door, hatch, or aperture designated as an exit in case of fire and leading either directly, or via other areas of the craft, to the open air

3.6
open flame device
appliance where direct bodily contact with an exposed open flame is possible during normal operation

3.7
petrol
hydrocarbon fuel or blends thereof that is liquid at atmospheric pressure and is used in spark ignition engines

Note 1 to entry: In this context, kerosene is not regarded as petrol.

3.8
diesel
hydrocarbon fuel or blends thereof that is liquid at atmospheric pressure and is used in compression ignition engines

3.9
asphyxiant
fire extinguishing medium that can dilute or displace oxygen in air, leading to asphyxiation if inhaled

3.10
toxic
fire extinguishing medium that can be poisonous or harmful if inhaled

3.11
escape route
way through which a person has to pass to access the nearest craft exit or *fire exit* (3.5)

3.12
habitable space
space surrounded by permanent structure in which there is provision for any of the following activities: sleeping, cooking, eating, washing/toilet, navigation, steering

Note 1 to entry: Spaces intended exclusively for storage, open cockpits with or without canvas enclosures and engine rooms are not included.

3.13
enclosed habitable space
habitable space (3.12) separated from the nearest *fire exit* (3.5) by bulkheads and/or solid doors

3.14
radiated heat device
appliance intended to transfer heat from its surfaces during normal operation by way of radiation

3.15
cooking appliance
appliance intended to be used for the preparation of food and that makes use of a heat source

3.16
heating appliance
appliance intended to be used for comfort heating with or without integral heat sources

3.17
solid fuel appliance
heating appliance (3.16) intended to be fuelled by solid minerals fuel, natural or manufactured wood logs or pellets, including solidified alcohol

3.18
decklight
translucent deck fitting providing daytime lighting to inboard spaces by refracting sunlight

Note 1 to entry: Decklights are usually no more than 200 mm in diameter.

3.19
shut off damper
air damper or rated fire damper device that closes or reduces air flow at engine space air intakes and/or exhaust ventilators

3.20
portlight
openable window in the hull of the craft below the sheer line and above the waterline

3.21
fire resistant
the ability of a material to self-extinguish upon the removal of an ignition source

3.22
craft
small craft
recreational boat, and other watercraft using similar equipment, of up to 24 m length of hull (L_H)

[SOURCE: ISO 8666:2020, 3.15]

4 Fire prevention

4.1 Cooking and heating appliances

4.1.1 General

Cooking and heating appliances shall be suitable for use in a marine environment.

When selecting appliances, consideration should be given to the size and design of the space into which the appliance is to be installed and the appliance's stated heat output.

Cooking and heating appliances shall be installed in accordance with the manufacturer's instructions for small craft installations and secured against accidental or unintended movement. Gimballed appliances shall include a retaining mechanism that meets this requirement.

Means shall be provided on or adjacent to stove-top cooking surfaces to prevent both deep and shallow cooking utensils from sliding across or off the stove, at pitch angles up to 15° for all craft, and at heel angles up to 30° for sailing craft or up to 15° for engine-driven craft and multihulls (sail and power).

4.1.2 Appliances with flues

Where flues and associated flue pipes are installed, they shall be:

— installed in accordance with manufacturer's instructions;

— routed directly to the open air so that no exhaust gases can enter the interior of the craft;

— insulated or shielded in accordance with 4.2.3.1, where necessary, to avoid overheating or damage to adjacent material or to the structure of the craft.

4.1.3 Permanently installed fuel systems

Permanently installed tanks and supply lines using fuel which is liquid at atmospheric pressure shall meet the applicable requirements of ISO 21487 and ISO 10088. In addition:

— permanently installed fuel tanks shall be installed outside Zone II according to Figure 1;

— filler openings for tanks shall be prominently identified to indicate the type of fuel to be used with the system;

— unless covered by the design and installation requirements of ISO 14895:2016, a readily accessible shut-off valve shall be installed in the supply line at the tank connection. If this is outside the space containing the appliance, a second valve shall be fitted in the fuel line in the space containing the appliance, outside Zone II according to Figure 1, but not behind the appliance. This requirement does not apply:

  — where the tank is located lower than the cooking appliance/heater and there is no possibility of back siphoning; or

  — where a fusible valve that prevents fuel from continuing to flow to an appliance in the event of a fire is installed in the appliance or near to the final fuel supply joint to it.

4.2 Materials near cooking or heating appliances

4.2.1 General

Materials and finishes (surfaces) used in the vicinity of open flame devices within the ranges as defined in Figure 1 shall comply with 4.2.2, taking into account the movement of the burner at pitch angles up

to 15° for all craft, and up to a heel angle of 30° for sailing craft or up to 15° for engine-driven craft and multihulls (sail and power).

These requirements do not apply to the materials of the appliance itself.

4.2.2 Protection from open flames

4.2.2.1 Materials installed in or that can enter Zone I shall not support combustion.

4.2.2.2 Materials installed in or that can enter Zone II shall either:

— not support combustion; or

— be thermally insulated from the supporting structure to prevent combustion of the supporting structure, if the surface temperature exceeds 80 °C during the fire test described in 4.2.2.4.

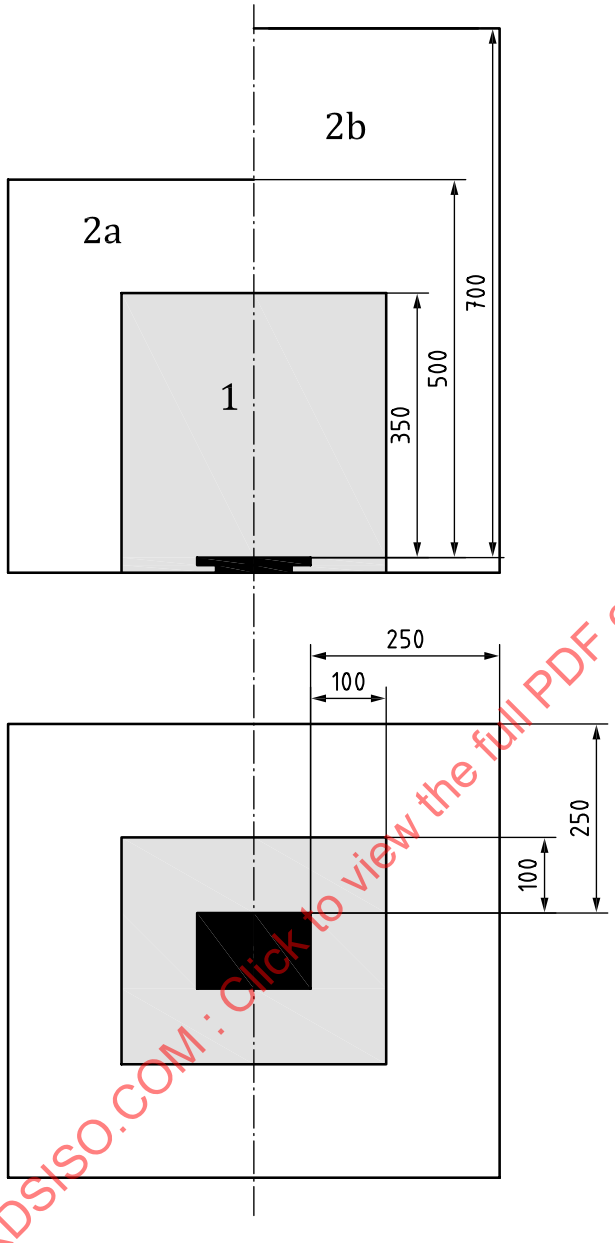
4.2.2.3 Materials intended to not support combustion shall have an oxygen index (OI) of at least 21 according to ISO 4589-3:2017 at ambient temperature of 60 °C.

NOTE Equivalent standards can be used to demonstrate compliance.

4.2.2.4 For conducting the test, each of the open flame burners shall be covered by a metal plate of 200 mm diameter and a thickness of 3 mm ± 0,2 mm. The flames shall burn for 10 min, the controls being set to the maximum. At the end of the burning period, the surface temperature of any material around the open flame device shall be measured.

Thermal insulation may be achieved by an air gap or by the use of a suitable material.

Dimensions in millimetres



Key

1 Zone I — area of the burner extended vertically 350 mm from its surface and horizontally 100 mm beyond its periphery

2a Zone IIa — for LPG, CNG or electric appliances: area of the burner extended vertically 500 mm from its surface and horizontally 250 mm beyond its periphery

2b Zone IIb — for liquid fuel appliances: area of the burner extended vertically 700 mm from its surface and horizontally 250 mm beyond its periphery

Figure 1 — Areas of special material requirements

4.2.3 Protection from radiated heat devices

4.2.3.1 If their surface temperature can exceed 85 °C, combustible materials adjacent to radiated heat devices and other appliances, whether exposed or covered, shall be thermally insulated to ensure that the surface temperature of the combustible materials does not exceed 85 °C with the appliance operating at its maximum nominal output.

4.2.3.2 Thermal insulation may be achieved by an air gap, a radiation shielding surface, or the use of a suitable material. Materials used to shield the combustible surface shall be ceramics, metals, non-combustible insulation board or other materials with similar fireproof characteristics.

Appliance manufacturer's instructions may be followed to meet this clause provided the appliance has been temperature tested in accordance with EN 12815:2013 or EN 13240:2001+A2:2004.

4.2.4 Protection from solid fuel appliances

4.2.4.1 Solid fuel appliances shall stand on and be secured to a hearth designed and constructed of suitable robust and non-combustible materials, substantial enough to support the weight of the appliance, and of appropriate dimensions such that, in normal use, it prevents ignition of floor coverings through radiated heat or in the event a hot solid fuel falls from the appliance.

Appliance manufacturer's instructions may be followed to meet this clause provided the appliance has been temperature tested in accordance with EN 12815:2013 or EN 13240:2001+A2:2004.

4.2.4.2 Combustible fixtures, fittings or furniture other than flooring and its covering shall not be positioned within the distance from solid fuel appliances specified by the manufacturer or, if no distance is specified, they shall not be positioned within 600 mm of the closest point to the appliance.

4.2.4.3 Free-hanging combustible material, such as curtains or blinds adjacent to a solid fuel appliance, shall not be fitted within less than the minimum distance specified by the manufacturer or, if no distance is specified, it shall not be fitted within 600 mm of the closest point to the appliance and any uninsulated flue pipe.

Careful consideration should be given in the selection of materials in all other parts of habitable spaces to ensure, as far as practical, that the materials are not readily ignitable and/or have low flame spread characteristics and do not readily give rise to toxic or explosive hazards at elevated temperatures.

4.2.5 Protection from electrical appliances

4.2.5.1 Free hanging curtains or other fabrics adjacent to electrical cooking hobs shall not be fitted in Zone I according to Figure 1.

4.2.5.2 Electrical heating appliances shall not be fitted with an element so exposed that clothing, curtains, or other similar materials can be scorched or set on fire by heat from the element.

4.3 Engine and fuel compartments and exhausts

4.3.1 General requirements not dependent on fuel type

4.3.1.1 Insulation material

Material used for the insulation of engine compartments shall

— present a non-fuel absorbent surface towards the engine, and

— not support combustion and have an oxygen index (OI) of at least 21 according to ISO 4589-3:2017 at an ambient temperature of 60 °C, or be tested to meet an equivalent standard.

4.3.1.2 Permanently installed fuel tanks

Permanently installed fuel tanks shall be designed and constructed in accordance with the requirements of ISO 21487, and shall be installed in accordance with ISO 10088.

4.3.1.3 Bilge cleaning

Bilges and other spaces that can contain spillage of petrol and diesel shall be accessible for cleaning and shall have a non-fuel absorbent floor surface.

4.3.1.4 Checking of exhaust water injection

Where a non-metallic component or flexible hose is part of a water-cooled exhaust system, a means to indicate a loss of cooling water shall be provided to prevent failure of the component or flexible hose. The means shall be obvious from the steering position.

NOTE A temperature or flow alarm can suffice.

4.3.2 Specific requirements for compartments containing fixed petrol engines and permanently installed petrol tanks

4.3.2.1 General

Compartments or spaces containing fixed petrol engines and/or permanently installed petrol tanks shall be separated from habitable spaces. This is met where the structure fulfils the following requirements:

a) the boundaries shall be continuously sealed (e.g. welded, brazed, glued, laminated or otherwise sealed);

b) penetrations for cables, piping, etc., shall be closed by fittings, seals and/or sealants;

c) access openings such as doors, hatches, etc., shall be equipped with fittings so they can be secured to minimize the flow of gas or vapours in the closed position.

The effectiveness of the boundary joints or sealing shall be demonstrated either by documentation or visual inspection.

4.3.2.2 Ignition protection

All electrical equipment shall be ignition protected as specified in 4.6.

4.3.2.3 Ventilation

Compartments or spaces containing either fixed petrol engines or permanently installed petrol tanks shall meet the ventilation requirements of ISO 11105:2020.

4.3.2.4 Insulation of permanently installed petrol fuel tanks from heat sources

Petrol fuel tanks shall be insulated from the engine or other source of heat by either

a) a thermal barrier between tank and engine, engine-mounted components including fuel and water supply lines, and any source of heat (e.g. bulkhead, wall, insulating material, etc.), or

b) an air gap to prevent any contact between the petrol fuel tank and engine, engine-mounted components, and any source of heat, the gap being wide enough to allow for servicing the engine and related components.

Any air gap shall be at least:

— 100 mm between a petrol engine and a petrol fuel tank;

— 250 mm between exhaust components having a temperature exceeding 90 °C and a petrol fuel tank.

NOTE Air gap requirements are addressed in ISO 10088.

4.3.3 Specific requirements for compartments containing portable petrol-engine equipment and portable petrol tanks or containers

Compartments or spaces designed to contain portable petrol-engine equipment, tanks and containers shall meet the requirements of 4.3.1.3, 4.3.2.1 and 4.3.2.2, and meet ISO 11105:2020, Clause 5.

Spaces used for the storage of outboard motors and portable generators with integral petrol tanks and 'garage' spaces containing personal watercraft are included in this requirement.

4.4 Electrical installations

The requirements for electrical systems to minimize the risk of fire and to prevent the accumulation of explosive gases which might be emitted from batteries are set out in the following ISO standards:

— direct current electrical installations operating at not more than DC 50 V shall be in accordance with ISO 13297;

— single phase electrical operating at not more than AC 250 V shall be in accordance with ISO 13297;

— three phase electrical systems operating at not more than AC 500 V shall be in accordance with IEC 60092-507:2014;

— electric propulsion systems shall be in accordance with ISO 16315.

NOTE Battery types common in electric propulsion might require specialized fire extinguishing medium.

4.5 Liquefied petroleum gas (LPG) systems

4.5.1 General

LPG appliances shall not be installed in engine compartments unless this location is in accordance with the manufacturer's instructions for installation in small craft.

Clearance between dry exhaust components or equivalent heat sources and LPG cylinders, pressure regulators and safety devices shall be at least 250 mm, unless an equivalent thermal barrier is provided.

4.5.2 LPG systems not used for propulsion

LPG systems shall be in accordance with ISO 10239:2014.

4.5.3 LPG systems used for propulsion

LPG propulsion systems shall be installed in accordance with EN 15609:2021 or equivalent.

4.5.4 Self-contained portable appliances

Self-contained portable appliances having LPG cylinders or containers attached shall be stored in accordance with the LPG cylinder storage requirements of ISO 10239:2014.

4.6 Ignition protection

Only ignition-protected items in accordance with ISO 8846:1990 shall be installed in compartments, lockers or housings that contain:

— petrol engines;

— petrol fuel tanks;

— petrol fuel line fittings;

— LPG cylinders (permanent and portable);

— LPG line fittings, with the exception of connections in the accommodation space near the appliance.

4.7 Decklights

Exposed materials within 300 mm below decklights shall be ceramics, aluminium, ferrous metals or other materials with similar fireproof characteristics, unless the decklight, by design, does not provide a focal point.

5 Fire detection

A fire detection device to alert craft occupants to the outbreak of fire is required for craft with more than one habitable space. Shower and toilet compartments are not to be included as an additional habitable space. The device shall be installed according to the device manufacturer's instructions.

Fire detection devices (e.g. smoke detectors or heat detectors) shall:

— be sized appropriately for the space they monitor;

— provide an audible alarm with a minimum rating of 85 dB;

— be connected to the on-board electrical supply or be independently powered;

— be at a minimum located in the habitable space(s) and the engine compartment.

Fire detection devices should be constructed to a recognized standard for marine environments, for example EN 14604 and UL 217RV.

6 Fire escape

6.1 Fire escape routes

6.1.1 General

Habitable spaces shall be provided with at least one fire escape route leading to the open air.

A fire escape route shall:

a) have a passage through doorways or hatches complying with the minimum requirements for fire exits (see 6.2);

b) not be obstructed by fixtures, fittings or furniture.

No escape route shall pass directly over an open flame appliance or a radiated heat device.

Where there is more than one escape route(s) provided, only one route can pass over, beside or through an engine compartment.

The distance to the nearest fire exit from each habitable space and/or bottom step of a staircase leading to the next habitable space or open air shall not exceed the greater of 6 m or $L_H/2{,}5$, (L_H = length of hull). The distance shall be measured in the horizontal plane, following along the escape route, between the nearest part of the fire exit and the farthest

— point where a person can stand (minimum height 1,60 m), or

— midpoint of a bunk,

whichever is greater.

Additionally, the fire escape route for enclosed habitable spaces for sleeping shall have:

i) its middle line passing not less than 500 mm from the centre of the closest burner of any open flame appliance, or else the distance measured along the middle line, from the cabin threshold to the bottom of the stairs leading to the open air, shall be less than 2 m;

ii) a fire detection device(s) provided in accordance with Clause 5, installed between any open flame appliance and the fire exit along the distance of the escape route;

iii) a portable extinguisher suitably sized as per Table 1, located in the escape route prior to reaching the appliance.

The description of escape routes and the location of fire exits shall comply with Clause A.4.

6.2 Fire exits

6.2.1 General

An exit not specifically designated as a fire exit may be considered as a fire exit if it fulfils the requirements in 6.2.2 to 6.2.6.

6.2.2 Minimum clear dimensions

Any fire exit from a habitable space shall have the following minimum clear openings:

— circular shape: 450 mm diameter;

— any other shape: minimum dimension of 380 mm, and 0,18 m^2 area; the dimensions shall be large enough to allow for a 380 mm diameter circle to be inscribed after taking account of any restriction introduced by any hinges, stays, etc.; see Figure 2.

Dimensions in millimetres

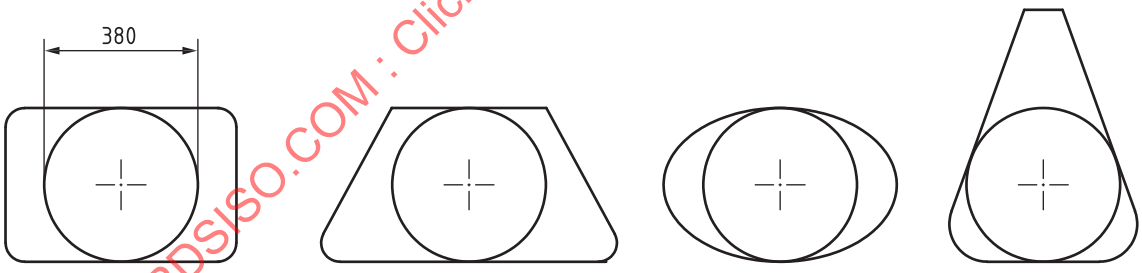


Figure 2 — Measurement of minimum clear opening

6.2.3 Positioning fire exits

Fire exits shall be positioned in an unobstructed and readily accessible location.

6.2.4 Capability to open fire exits

Fire exits leading to the weather deck or to the open air shall be capable of being opened without the use of tools, from the inside and the outside when closed and unlocked. The requirement does not apply to portlights of insufficient size to be designated as fire exits.

Winch handles and similar equipment are considered tools.

6.2.5 Deck hatches designated as fire exits

Where deck hatches are designated as fire exits:

— the vertical distance to the fire exit shall not exceed 1,2 m; in the case of cushions or mattresses, this distance shall be taken from the compressed material; or

— if the distance exceeds 1,2 m, footholds, ladders, steps or other means provided to meet this requirement shall be permanently installed, or readily accessible.

Folding or deployable devices are acceptable, but their stowage location shall be clearly indicated by a label (see 8.5).

Information on the operation and location of folding or deployable devices shall comply with Clause A.4.

6.2.6 Watertightness of fire exits

Fire exit openings that are critical for the craft's watertightness, i.e. those that could lead to flooding in case of rupture of the cover plate, shall conform to the applicable requirements of ISO 12216.

7 Fire-fighting equipment

7.1 Purpose

This clause specifies minimum fire-fighting requirements according to the type of engine fuel and power rating, the habitable spaces and the provisions of heating and cooking appliances.

7.2 Protection of habitable spaces containing sleeping bunks

Craft fitted with habitable spaces containing sleeping bunks shall be equipped with at least a 5A/34B rated portable fire extinguisher in accordance with 7.5.4.

7.3 Protection of habitable spaces containing cooking and heating appliances

Each habitable space containing cooking or heating appliances shall be protected by a portable fire extinguisher in accordance with 7.5.4, and according to Table 1.

Table 1 — Protection of habitable spaces with cooking and heating appliances

Type of cooking/heating appliances	Protection achieved by
Without open flame	One portable extinguisher with fire rating 5A/34B or a fixed system in accordance with 7.6.
With open flame	Portable extinguisher(s) with minimum total capacity 8A/68B or fire blanket according to 7.7 plus one portable extinguisher 5A/34B or a fixed system accordance with 7.6.

NOTE The fire ratings of portable fire extinguishers required by Tables 1 and 2 correspond to the definitions in EN 3-7. Annex C gives information from EN 3-7 on the characteristics of typical fire rating according to the mass or volume of extinguishing medium and provides the equivalence with other regulations.

7.4 Protection of engine compartment(s)

7.4.1 General

The protection of engines and engine compartments shall be achieved according to the requirements listed in Table 2.

Table 2 — Protection of the engine(s) and engine compartments

Engine position	Criteria	Protection achieved by
Outboard engine(s)	P [a] ≤ 25 kW	No extinguisher required
	P > 25 and P ≤ 220 kW	1 portable extinguisher 34B
	P > 220 kW	2 portable extinguishers 34B
Petrol engine(s)	Petrol engine located in engine box above deck	— Portable extinguisher(s) to fire port [c] or — Fixed system according to 7.6
	Petrol engine compartments below deck	— Fixed system according to 7.6
Diesel engine(s)	Diesel engine compartment ≤ 3,5 m^3 net volume [b] and P ≤ 120 kW	— Portable extinguisher(s) to fire port [c] or — Fixed system according to 7.6
	Diesel engine compartment > 3,5 m^3 net volume [b] or P > 120 kW	— Fixed system according to 7.6
For engine types not addressed by this table, the engine manufacturer's recommendations should be followed for the prescribed fire protection. [a] P is the combined declared power in kW of the engine or engines in the space. [b] Net volume is the gross volume of the engine compartment minus the volume of all fixed engine compartment components such as engines, fuel tanks, batteries. [c] The fire rating of the portable extinguisher shall not be less than the minimum recommended by its supplier for use with the fire port and for the volume of the engine box and space. See Annex B for portable fire extinguisher ratings.		

7.4.2 Fire ports

7.4.2.1 General

Where inboard engines are protected by portable fire extinguisher(s) intended for use in a fire port, such fire port shall be positioned so that the extinguishing medium can be properly discharged in the engine compartment without opening the primary access and in accordance with the extinguisher manufacturer's instructions.

Information on the location and use of fire ports shall comply with A.2.2.

7.4.2.2 Size, location and positioning

Fire ports shall be:

— sized to accept the discharge nozzle;

— openable to provide ready access for discharge of the medium into the engine compartment;

— located so the required size of extinguisher can be operated in a position that allows complete discharge of the extinguishing medium in the required location;

— sealed to the habitable space, when closed and not in use, for any port to an engine compartment located inside a habitable space;

— labelled with "Fire port" or an appropriate graphical symbol; if a graphical symbol is used, it shall be explained in the owner's manual.

7.5 Portable fire extinguishers

7.5.1 Purpose

This subclause specifies the type(s), size(s), number, location and storage of portable fire extinguishers on board.

NOTE The requirements for extinguishers can be subject to national regulations.

In the owner's manual, information concerning portable fire extinguishers, fire ratings and any specific intended purpose or extinguishing media requirements shall comply with Annex A.

For guidance on the classification of fires and the desirability of selecting portable fire extinguishers having accredited third party certification, see Annex B.

7.5.2 General requirements

7.5.2.1 Marking

Marking of portable fire extinguishers shall be in accordance with EN 3-7:2004+A1:2007 or ISO 7165:2017 or equivalent.

7.5.2.2 Accessibility

All portable fire extinguishers, or their designated locations, shall be readily accessible.

7.5.2.3 Location

Portable extinguishers located where they might be exposed to splashed or sprayed water shall have extinguisher operating nozzle and triggering devices shielded unless the extinguishers are certified or listed for marine service.

7.5.2.4 Storage

Portable extinguishers may be stored in a locker or other protected or enclosed space. The locker or the enclosed space door shall carry the appropriate symbol in accordance with 8.5.

7.5.2.5 Medium

Extinguishing media shall not be used so that it results in toxic concentrations in the space where it is discharged.

Extinguishing media containing Halon 1211, 1301 and 2402 and per-fluorocarbons shall not be used.

NOTE National legislation can specify the accepted extinguishing media.

7.5.3 Carbon dioxide (CO_2) extinguishers

7.5.3.1 Location

Portable carbon dioxide (CO_2) extinguishers may only be located in habitable spaces where energised electrical equipment is located (e.g. electric motor space, battery space, switchboard) or flammable liquids are present (e.g. galley).

7.5.3.2 Maximum capacity and number

Any individual CO_2 extinguisher shall have a maximum capacity of 2 kg.

There may be no more than one CO_2 extinguisher in each habitable space.

7.5.3.3 Warning and information

Where a CO_2 extinguisher is provided, except for craft having no habitable spaces, a warning notice shall be affixed near the location of such extinguisher in accordance with 8.3, and a warning included in the Owner's manual according to Clause A.7.

7.5.4 Location and capacity of portable fire extinguishers

7.5.4.1 Location

There shall be a portable fire extinguisher readily accessible:

— within 2 m distance from the main helm position;

— within 2 m from any permanently installed cooking and heating appliance or open-flame device, but so located that it is accessible in the event of a fire at any such appliance or open-flame device;

— within 5 m distance from the centre of a bunk measured in the horizontal plane;

— within 3 m from outboard engines or from fire ports for inboard engines, where required.

The owner's manual shall provide information concerning the responsibility of the owner to select an effective portable fire extinguisher for use with the fire port provided, in accordance with Annex A.

7.5.4.2 Capacity

At least one extinguisher of 5A/34B capacity shall be located within each 20 m^2 of the habitable space.

Where habitable spaces are protected by a fixed system according to 7.6, only one portable fire extinguisher needs to be provided for that space.

7.6 Fixed fire extinguishing systems

7.6.1 Purpose

This clause specifies requirements for fixed fire extinguishing systems, where fitted, with manual and/or automatic operation.

NOTE 1 Such fixed systems can be subject to national requirements.

NOTE 2 This document does not specify the technical requirements for the cylinders containing the extinguishing medium.

NOTE 3 Information on the requirements for pressurized cylinders in Europe and the USA is provided in Annex C.

7.6.2 General requirements

7.6.2.1 Fixed system approvals

Fixed systems shall be "approved systems". An "approved system" shall have been tested against a recognized test standard and the successful test outcome shall be supported by a test report from a test laboratory approved to test products to the recognized standard. It is essential the test shows that the number of nozzles and positions recommended by the manufacturer cover the compartment it is intended to protect. Further information on "approved systems" is provided in Annex C.

7.6.2.2 Installation

Fixed systems shall be sized and installed in accordance with the system manufacturer's instructions for the space intended to be protected, including any requirement for shut off dampers (see 7.6.4.4.3).

7.6.2.3 Medium

Fixed systems shall use a total flooding medium.

Extinguishing media shall not be used so that it results in toxic concentrations in the space where it is discharged.

Concentrations should not exceed the media's lowest observed adverse effect level (LOAEL).

Extinguishing media containing Halon 1211, 1301, and 2402 and per-fluorocarbons shall not be used.

NOTE National legislation can specify the accepted extinguishing media.

7.6.2.4 Temperature of operation

Fixed systems shall be capable of operating in an ambient temperature higher than 0 °C.

7.6.2.5 Multiple systems

If more than one fixed system is installed in a space, each system shall be capable of individually protecting the space, unless their discharge is simultaneous.

7.6.2.6 Location of the cylinders

If the cylinders are located inside the space to be protected or if the activation of the fixed system is automatic, a visual indication of discharge shall be provided outside the space.

7.6.3 General installation requirements

7.6.3.1 Fastening

The components for a fixed system shall be securely fastened to the craft's structure to withstand motions, shock and vibrations from normal craft operating conditions.

To minimize corrosion, cylinders shall be mounted clear of the anticipated bilge water level and above surfaces on which water can accumulate.

7.6.3.2 Temperature

Cylinders containing the extinguishing medium, distribution lines and controls shall be located so that they are not subject to temperatures outside the system's designed operating range, while the craft is in service.

7.6.3.3 Accessibility of the cylinders

Cylinders shall be accessible for removal. Controls and gauges shall be readily accessible and visible.

7.6.3.4 Non-metallic components

Non-metallic components of the distribution line(s), including their fixtures, that are not intended to melt as part of the fire-fighting system as installed shall be fire resistant or be otherwise protected from fire.

7.6.4 Activation of the system

7.6.4.1 General

For automatic systems, a remote discharge indicator shall be installed and shall be clearly visible from the main helm position.

7.6.4.2 Manual release systems

A manual release device shall be readily accessible and operable using a maximum force of 100 N. A label showing how to discharge the system shall be provided immediately adjacent to the release device, with the protected space(s) identified. A means of preventing accidental discharge shall be provided.

7.6.4.3 Diesel engine shut-down

In fixed systems using gas to protect a space containing a diesel engine, there shall be a device, manual or automatic, that shuts down the engine before or during the discharge or activation.

7.6.4.4 Gas concentration

7.6.4.4.1 In fixed systems using gas to protect a space, means shall be provided to ensure that the minimum design concentration of the extinguishing medium is maintained until the fire is extinguished.

7.6.4.4.2 Prior to or during system discharge, the manual and/or automatic shutdown of engines, generators, forced ventilation, or other permanently installed equipment which could compromise the levels of extinguishing medium in the protected area, shall be provided.

7.6.4.4.3 Where equipment shutdown as specified 7.6.4.4.2 cannot guarantee that extinguishing medium design concentration can be maintained, shut off dampers closing the ventilation ducts shall be installed.

7.6.4.5 Shut off dampers

Shut off dampers, where required as specified in 7.6.4.4.3, shall be capable of being closed, before or during the discharge or activation of the system, and the minimum effective extinguisher media concentration shall be maintained. Where required, closing of shut off dampers on automatic systems shall be automatic. Manual systems may use a manual or automatic damper.

7.6.4.6 Power supply indicator

For automatic systems having a single external power source, a means to indicate to the craft occupants that the power supply is active shall be provided.

7.7 Fire blanket

Where required by Table 1, a fire blanket in accordance with EN 1869:2019 shall be fixed within reach of any open flame cooking appliance or deep fat fryer, and so located that it can be readily accessible in the event of a fire.

In the owner's manual, information pertaining to fire blankets shall comply with Annex A.

8 Displayed information

8.1 General requirements

The information shall be in the appropriate language acceptable to or required in the country of intended use. It can be multilingual. If only provided in an electronic means, the manufacturers shall have a procedure in place that allows printing of the owner's manual by the owner.

NOTE 1 The information can be represented by symbols in accordance with ISO 7010 or with other relevant national standards.

NOTE 2 For the general warning sign, see ISO 7010-W001.

8.2 Fixed system warning for non-asphyxiant medium

Where a space is protected by a fixed fire extinguishing system with manual activation capability, the following information as shown in Figure 3 shall be displayed near the manual release device:

Background: yellow

Figure 3 — Fixed system warning for non-asphyxiant medium

8.3 CO_2 portable extinguisher

The following information in Figure 4 shall be displayed near any CO_2 portable extinguisher:

Background: yellow or orange

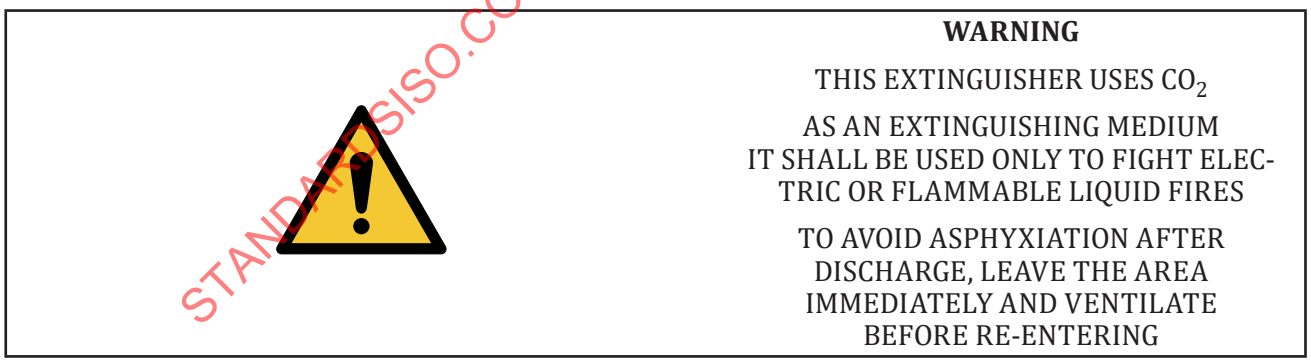


Figure 4 — CO_2 Portable fire extinguisher

8.4 Storage of ladder to escape hatch

The following information in Figure 5 shall be displayed near the storage area to indicate the location of any stowed folding or deployable devices to aid escape through a fire exit hatch.

White letters/green background

IMPORTANT SAFETY INFORMATION

FIRE EXIT LADDER INSIDE

Figure 5 — Storage of ladder to escape hatch

8.5 Displayed symbol requirements

The symbol in accordance with Table 3 shall be displayed where appropriate.

Table 3 — Symbols

Symbol	Colour		Application	Source
	Symbol/Text	Background		
	Symbol: white	Red	Designated place of portable fire extinguisher or locker where it is stowed	ISO 7010-F001
NOTE Other symbols can be used as appropriate, preferably from ISO 7010.				

9 Owner's manual

The information and instructions that shall be included in the owner's manual are listed in Annex A.

Annex A
(normative)

Information in the owner's manual

A.1 General

An owner's manual shall be provided with the craft, which shall include at least the following information.

NOTE Requirements for craft's owner's manuals are provided in ISO 10240.

Fire protection information shall be sufficiently detailed and, where appropriate, shall include sketches, diagrams or photos to impart a full understanding of equipment location, escape routes, etc.

The information in Clauses A.2 to A.7 shall be included, as applicable.

A.2 Fire-fighting equipment

A.2.1 Portable fire extinguishers

Information shall be included concerning any specific intended purpose or extinguishing media requirements for portable fire extinguishers, such as the number, location, type and capacity.

Where a CO_2 extinguisher is provided, except for craft having no habitable space, information shall be included about the asphyxiation hazards with instructions to leave the area immediately after discharge and to ventilate prior to re-entering the area.

A.2.2 Fire port facilities

Information shall be included concerning the location and use of any installed fire port, as well as a graphical symbol if used to designate the fire port.

Information shall be included concerning the responsibility of the owner to select an effective portable fire extinguisher for use with any installed fire port, if a portable fire extinguisher is not supplied.

A.2.3 Fire blanket

Information shall be included concerning the location of any provided fire blanket.

A.2.4 Fixed systems

Information shall be included concerning the safe operation of any installed fixed system. Instructions shall indicate the operation that shall be performed, where needed, before, during, and after discharge. These shall contain, where relevant, instructions on evacuation of the protected space, stopping the engine and fuel feed, stopping of forced ventilation, and activating shut off dampers.

The following information shall be included concerning the servicing of fire-fighting equipment:

— fire-fighting equipment shall be checked at the intervals indicated on the equipment;

— portable fire-fighting equipment shall be replaced if degraded, expired, or discharged, by devices of identical or greater fire-fighting capacity;

— fixed systems shall be refilled or replaced when expired or discharged;