
Small craft — Waste systems —

**Part 1:
Waste water retention**

Petits navires — Circuits d'eaux usées —

Partie 1: Rétention des eaux usées

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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).

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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html. (standards.iteh.ai)

This document was prepared by Technical Committee ISO/TC 188, *Small craft*.

This first edition cancels and replaces ISO 8099:2000, which has been technically revised.

The main changes compared to the previous edition are in 4.1, 4.2, 4.9 and 9.4.

A list of all parts in the ISO 8099 series can be found on the ISO website.

Small craft — Waste systems —

Part 1: Waste water retention

1 Scope

This document specifies requirements for the design, construction and installation of systems for temporary retention of sewage for subsequent disposal. It applies to small craft with a length of hull (L_H) of up to 24 m.

This document does not address waste water treatment systems.

2 Normative reference

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 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 9093-1, *Small craft — Seacocks and through-hull fittings — Part 1: Metallic*

ISO 9093-2, *Small craft — Seacocks and through-hull fittings — Part 2: Non-metallic*

ISO 10133, *Small craft — Electrical systems — Extra-low-voltage d.c. installations*

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

3 Terms and definitions

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

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 retention system

interconnected sanitation equipment including hoses, pipes, *holding tank* (3.6) and fittings designed for use on board small craft to receive, retain, vent and dispose of *sewage* (3.2)

3.2 sewage

human body wastes and the wastes, including flushing water, from toilets and other receptacles intended to receive or retain these wastes

3.3 accessible

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

3.4
readily accessible

capable of being reached for operation, inspection or maintenance without removal of any parts of the craft structure or use of any tools

3.5
portable holding tank

holding tank (3.6) designed and intended to be removed from the craft for the disposal of its contents

3.6
holding tank

tank intended to receive and hold *sewage* (3.2) from toilets and other receptacles for disposal at another time

4 General requirements

4.1 Any toilet in a retention system shall be connected solely to a holding tank. If required, a Y-valve shall not be placed between the toilet and the holding tank.

NOTE See [Annex B](#) for an example of a typical installation.

4.2 Craft with permanently installed holding tanks shall be fitted with a standard discharge connection as specified in [Annex A](#) to enable pipes of reception facilities to be connected with the craft discharge pipeline.

Any through-hull fittings for sewage shall be fitted with valves which are capable of being secured in the closed position.

4.3 The system shall be installed to prevent the emission of vapour and liquids within the craft.

4.4 The system shall be capable of operation throughout an ambient temperature range of +1 °C to +60 °C and shall withstand, when empty, an ambient temperature range of -40 °C to +60 °C.

4.5 The system shall be capable of operation, i.e. discharge of sewage from the toilet to the retention system, when the boat is heeled at all angles up to 20° for monohull sailing craft and 7° for other craft.

4.6 Back siphoning shall be prevented from raw water intakes and discharge outlets up to a heel angle to either side of at least 30° for monohull sailing craft, 20° for other craft and a trimmed condition at the bow or stern of at least 10°.

4.7 Back siphoning of the contents and escape of gas from the holding tank back through the toilet fixture shall be prevented when the boat is heeled at all angles up to 30° for monohull sailing craft, 20° for other craft and a trimmed condition at the bow or stern of at least 10°.

4.8 Escape of sewage from the holding tank to the exterior of the craft shall be prevented when the boat is heeled at all angles up to 30° for monohull sailing craft, 20° for other craft, at 90 % of tank capacity and to the interior of the craft under maximum anticipated conditions of heel or trim, i.e. 45° for monohull sailing craft, 30° for other craft.

4.9 Electrical systems shall meet the electrical requirements of ISO 13297 and ISO 10133.

4.10 The permanently installed retention system including all tanks, connecting piping, hoses, and fittings, shall be tested to withstand a pressure of 20 kPa for a period of 5 min without leaking.

The tank shall withstand a negative pressure of 20 kPa for a period of 5 min without permanent deformation.

5 Materials

Materials shall be resistant to the effects of the following:

- a) sewage;
- b) fresh, salt or brackish water with
 - 1) impurities,
 - 2) waste water from toilet systems,
 - 3) oily bilge water;
- c) disinfectants, deodorants and antifreeze solutions recommended by the system manufacturer;
- d) household cleaning agents recommended by the system manufacturer;
- e) chemical compounds, in solid, liquid or gaseous form, likely to be generated by the operation of the system.

6 Plumbing system

6.1 Hoses and piping

Hoses and piping shall be suitable for use in sewage systems.

Connecting hoses and piping shall be securely fastened in position to prevent damage by abrasion or vibration.

Piping or hose between the toilet and holding tank, and between the tank and the pump-out fitting, shall be as short as practicable, and its inner surface shall

- be smooth and without convolutions to permit free flow of sewage, and
- have an inside diameter in conformity with the toilet manufacturer's recommendations, or have a minimum inside diameter of 38 mm, if no recommendations are provided.

6.2 Seacock fitting

Retention systems with the possibility of overboard discharge of sewage from the tank overboard shall be fitted with a seacock at the through-hull fitting. Any seacock used for overboard discharge shall be in accordance with ISO 9093-1 and ISO 9093-2, and shall be capable of being secured in the closed position.

7 Vent system

7.1 Venting of gases

7.1.1 Heel angles

The system shall provide for venting of gases within the system to the exterior of the craft at heel angles up to 20° at 90 % of tank capacity.

7.1.2 Inside diameter of fittings

The inside diameter of fittings to which vent piping is connected shall not be less than 75 % of the inside diameter of the piping

7.1.3 Prevention of clogging — Pressure resistance

The design and construction of the vent system shall minimize clogging which might arise due to either the contents of the tank or as a result of weather conditions. The vent shall be capable of resisting, without damage, a negative pressure of 20 kPa.

7.1.4 Flow area

The minimum flow area through vent screens and equivalent flow resistance of any filters installed in the vent system shall be not less than the smallest flow area in either the vent pipe or its fittings.

7.2 Venting of tanks

7.2.1 Rigid tanks with capacity of less than 400 l

The minimum inside diameter of the vent pipe shall be 19 mm.

A vent pipe of inside diameter not less than 16 mm may be used if the tank is fitted with an automatic (vacuum operated) or manual relief valve with a minimum combined area of 1 100 mm².

7.2.2 Rigid tanks with capacity of 400 l and greater

The minimum inside diameter of the vent pipe shall be 38 mm.

If multiple vent pipes are used, their inside diameter shall be at least 19 mm and the combined cross-sectional flow area shall be at least equivalent to that of a single vent pipe with an area of 1 100 mm². As an alternative, a vent pipe of inside diameter not less than 16 mm may be used if the tank is fitted with an automatic (vacuum operated) or manual relief valve with a minimum combined area of at least 1 100 mm².

If a manual relief valve is fitted, a sign shall be installed, in symbols or language acceptable in the country of use, located in the vicinity of the pump-out fitting, indicating that the relief valve must be opened prior to pump out.

7.2.3 Venting of flexible tanks

Flexible (collapsible) tanks shall have at least one vent of inside diameter minimum 16 mm.

8 Holding tanks

8.1 General requirements

8.1.1 Fastening

The holding tank shall be securely fastened and located independently of any connecting piping.

8.1.2 Indication of contents level

As a minimum the level of holding-tank contents shall be observable when the holding tank is 3/4 full by volume, when the tank is viewed in a readily accessible location, or indicated by another means.

8.1.3 Accessibility of fittings and connections

Holding-tank fittings and connections shall be accessible for inspection and maintenance.

8.1.4 Access opening

Holding tanks of capacity greater than 40 l shall have an accessible sealable (i.e. gastight and watertight) minimum opening of 75 mm diameter for flushing, cleaning and maintenance.

8.1.5 Tank walls

Holding tanks shall not have common walls, tops or bottoms with fuel or potable-water tanks.

8.2 Requirements for permanently installed holding tanks

8.2.1 The tank, as designed, shall provide removal of at least 90 % of its contents through the pump-out fitting.

8.2.2 Baffles, if any, in holding tanks shall have openings to allow sewage and vapour to flow freely across the top and bottom.

8.2.3 Fittings, including the covers of clean-out openings, shall be designed and constructed to ensure a gastight and watertight closure.

8.3 Requirements for portable holding tanks

8.3.1 Portable holding tanks shall not be connected to any through-hull fitting.

Portable toilets, equipped with a discharge fitting, shall be considered a permanently installed holding tank.

8.3.2 The internal diameter of the vent line for portable holding tanks, if used, shall not be less than 16 mm and shall have a quick disconnect at the tank vent opening, with a cap or closing device permanently attached to the tank, which ensures a watertight seal during transport of the tank.

8.3.3 All other holding-tank openings shall be sealed with watertight and gastight closing devices.

8.3.4 Handles or recesses for carrying the tank shall be provided on the tank in a location that will allow safe transport and emptying of the tank.

8.3.5 A label that shows how to disconnect, transport and empty the tank shall be visibly displayed on the tank.

9 Pump-out fitting

9.1 The dimensions of the pump-out fitting shall be as shown in [Figure A.1](#).

NOTE [Figure A.1](#) does not determine the overall design.

9.2 Threads shall be in accordance with ISO 228-1.

9.3 The pump-out fitting shall be identified by marking, on the fitting or in its vicinity, with at least the symbol in accordance with [Figure A.2](#).

9.4 The fitting shall have a sealing cap, the design of which is left to the discretion of the manufacturer. The cap retention system, if used, shall not impede the proper function of the pump-out.