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## Small craft — Electrically operated bilge pumps

*Petits navires — Pompes de cale à moteur électrique*

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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](http://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](http://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](http://www.iso.org/iso/foreword.html).

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

This third edition cancels and replaces the second edition (ISO 8849:2003), which has been technically revised.

The main changes compared to the previous edition are as follows:

- clarified scope and applicable voltages;
- editorial changes made throughout the standard for clarity.

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](http://www.iso.org/members.html).

# Small craft — Electrically operated bilge pumps

## 1 Scope

This document specifies requirements for electrically operated bilge pumps intended for use in removing bilge water. It applies to:

- direct current (DC) bilge pumps which operate at a nominal voltage not exceeding 50 V; and
- single phase alternating current (AC) bilge pumps which operate at a nominal voltage not exceeding 300 V.

It does not cover pumps intended for damage control.

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

ISO 10133:2012, *Small craft — Electrical systems — Extra-low-voltage d.c. installations*

ISO 13297:2014, *Small craft — Electrical systems — Alternating current installations*

IEC 60529:2013, *Degrees of protection provided by enclosures (IP Code)*

## 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:

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

### 3.1

#### **automatic pump**

pump equipped with a sensing means that activates and deactivates the pump's operation at predetermined liquid levels

### 3.2

#### **nominal voltage**

voltage commonly used on *small craft* (3.6) with direct current (DC), such as 6 V, 12 V or 24 V, and alternating current (AC) such as 110/120 V or 230/240 V

### 3.3

#### **non-submersible pump**

pump designed to be operated above water

### 3.4

#### **submersible pump**

pump designed to be operated completely immersed in water

3.5

**design voltage**

113 % of nominal voltage (3.2)

3.6

**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 length of hull ( $L_H$ ) is defined in ISO 8666:2019.

3.7

**critical bilge-water level**

level at which bilge water contacts metallic fuel tanks, couplings, engine pans, non-submersible machinery, or non-watertight electrical circuits and connections, with the craft in the static floating position or in normal operation

**4 General requirements**

4.1 Bilge pumps shall be designed to operate for a continuous 24-hour period at 87,5 % of nominal voltage, up to their design voltage at the point within the range of performance recommended for the pump that results in the highest power consumption.

4.2 Bilge pumps and devices used to convert bilge pumps to automatic operation installed in compartments where explosive vapour and gasses may accumulate shall meet the ignition protection requirements specified in ISO 8846:1990.

4.3 Bilge pumps and devices used to convert bilge pumps to automatic operation shall meet the electrical requirements of ISO 10133:2012 or ISO 13297:2014.

4.4 Bilge pumps shall be rated in litres of water flow per minute or per hour at nominal voltage, at static pressures of 0 kPa, 10 kPa and 20 kPa, i.e. heads of 0 m, 1 m and 2 m, discharging through a smooth-bore hose fixed to the pump-outlet of an inside diameter equal to the pump outlet outside diameter and of a length equal to 1,5 times the lift.

The pump rating and capacities shall be stated in the installation and operating instructions provided with the pump.

The pump rating shall include the maximum output pressure and lift at which the pump ceases operation, i.e. the discharge of water.

4.5 Bilge pumps shall be provided with means of securely fastening them to the craft.

4.6 Materials used in the construction of bilge pumps, which can be expected to come in contact with sea water, shall be

- selected or coated to be resistant to corrosion;
- galvanically compatible; and
- resistant to deterioration by bilge-cleaning agents and intermittent exposure to petrol (gasoline), oil and diesel fuel.

4.7 Submersible pumps shall be provided with a strainer or other means of preventing debris entering the pump inlet. Inlet strainers and screens shall be designed such that they can be cleaned.

**4.8** Installation and operating instructions shall be available for each bilge pump. An electrical diagram shall be provided. It shall identify each conductor and shall include the proper location of the control switch(es) in the circuit and the bonding connection, if applicable. The recommended overcurrent protection for non-integrally protected bilge pumps shall be stated.

**4.9** Centrifugal and axial flow pumps shall be capable of operating dry at their design voltage for at least 7 h without creating a fire hazard. Alternatively, a means integral with the pumps shall be provided to shut the pump off automatically to prevent a fire hazard.

**4.10** Positive or semi-positive displacement pumps, i.e. those in which the impeller can be in continuous contact with the housing when operating dry, shall be capable of operating dry at their design voltage for at least 5 min without damage to the impeller or housing and for at least 1 h without creating a fire hazard. Alternatively, a means integral with the pumps shall be provided to shut the pump off automatically to prevent a fire hazard. Information shall be provided in the owner's manual cautioning against operating the pump dry for more than 1 min.

## 5 Electrical requirements

**5.1** Submersible pumps shall have watertight electrical connections, IP 67 in accordance with IEC 60529:2013.

The use of a length of watertight electrical cable sealed at the pump connection is recommended, so that connections to the power supply can be made above the critical bilge-water level.

**5.2** Metallic parts of a DC pump housing that can be exposed to contact with bilge water and can become a source of stray current leakage shall have provisions for equipotential bonding conductor connections.

Pumps designed with a double-insulated electrical system, requiring a break in two distinct insulation systems before electrical leakage can reach exposed metallic parts, do not require a bonding connection.

**5.3** Bilge pumps shall be protected against continuously locked rotor conditions by

- integral overcurrent protection, or
- overcurrent protection in the circuit of a size to protect the bilge-pump motor,
- being capable of sustaining operation with a locked rotor for 7 h without generating surface temperatures in excess of 150 °C, at an ambient temperature of 60 °C, and without evidence of charring, burning or melting,
- temperatures not exceeding 150 °C when the pump operates at 120 % of nominal voltage in an ambient temperature of 60 °C for 7 h.

**5.4** DC bilge pumps shall be capable of withstanding a DC voltage of 500 V for 1 min without leakage in excess of 1 mA. The test voltage shall be applied between the current-carrying parts and the non-current-carrying metal parts. If the pump is internally earthed, the earth connection shall be broken in order to carry out this test.

AC bilge pumps shall be fitted with or supplied by a circuit protected by a residual current device (RCD).

**5.5** Bilge pumps designed for automatic operation shall be provided with an override switch to permit manual operation if the automatic operation fails.

## 6 Marking

Each bilge pump shall be marked as follows, by a name-plate or other equally permanent means, with at least the following information:

- manufacturer's name or identification;
- model and/or serial number;
- electrical rating in volts and amperes;
- a reference to this document, i.e. "ISO 8849";
- output rating at 10 kPa (1 m lift) (see 4.4);
- the reference "ISO 8846 MARINE" (if applicable).

## 7 Owner's manual

The following information shall be included in the owner's manual.

- The pump rating and capacities shall be stated in the installation and operating instructions provided with the pump.
- Installation and operating instructions shall be available for each bilge pump. An electrical diagram shall be provided. It shall identify each conductor and shall include the proper location of the control switch(es) in the circuit and the bonding connection, if applicable. The recommended overcurrent protection for non-integrally protected bilge pumps shall be stated.
- Information about the risk of operating a positive or semi-positive displacement pump in a dry condition.



## Annex ZA (informative)

### Relationship between this European Standard and the essential requirements of Directive 2013/53/EU aimed to be covered

NOTE Annex ZA is not included in the final ISO publication.

This European standard has been prepared under a Commission's standardization request M/542 C(2015) 8736 final to provide one voluntary means of conforming to essential requirements of Directive 2013/53/EU.

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in [Table ZA.1](#) confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

**Table ZA.1 — Correspondence between this European Standard and Annex I of Directive 2013/53/EU**

Essential Requirements of Directive 2013/53/EU	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
Annex I, Part A, 2.5 – Owner's manual	<a href="#">4.10, 7</a>	
Annex I, Part A, 3.5 – Flooding, (c) removal of water by pumps or other means.	<a href="#">4, 5, 6</a>	In respect of electrically operated bilge pumps intended for the removing bilge water only.  This International Standard does not cover pumps intended for damage control.
Annex I, Part A, 5.3 - Electrical system	<a href="#">4.2, 4.3, 4.8, 5</a>	In respect of the electrical requirements to ensure the proper operation of electrically operated bilge pumps only.  This International Standard does not deal with the following elements of this essential requirement; — Electric shock;  — Interaction with electric propulsion circuits;  — Battery ventilation
Annex I, Part A, 5.6.1 – Fire protection, General	<a href="#">4.9, 4.10, 5.5</a>	In respect of preventing a fire hazard
Annex II, Components (1) Ignition protected equipment for inboard and stern drive engines and petrol tank spaces	<a href="#">4, 5.1 to 5.4</a> inclusive, <a href="#">6</a>	This standard is relevant in respect of the requirements for ignition protected electrically operated bilge pumps that are suitable for watercraft with inboard or stern drive engines and petrol tank spaces and which are supplied as components.