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**Inflatable boats —**

**Part 3:**

**Boats with a length of the hull less than 8 m with a motor power rating of 15 kW and greater**

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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 document 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)).

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

This document was prepared by Technical Committee ISO/TC 188, *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 third edition cancels and replaces the second edition (ISO 6185-3:2014), which has been technically revised.

The main changes are as follows:

- Type VII and VIII boats now distinguished only by design category, not by power;
- definitions updated to reflect current practice;
- Type VIII (category) boats are permitted a greater range of heel angle to achieve the minimum required righting moment;
- to reflect the increase in power and speed, in-water performance tests may be conducted at less than full power and in smaller waves;
- crew are recommended not to sit on tubes when operating at high-speed or in waves higher than 2 m, regardless of their design category;
- addition of requirements for design and testing of lifting points.

A list of all parts in the ISO 6185 series can be found on the ISO website.

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).

## Introduction

The ISO 6185 series is subdivided into four parts as shown below. It excludes:

- boats with a tube consisting of a single buoyancy chamber;
- boats < 1 800 N buoyancy;
- boats made from unsupported materials > 12 kN inflated buoyancy and powered by engines > 4,5 kW.

It is not applicable to:

- aquatic toys;
- inflatable liferafts.

ISO 6185-1:

- Type I Boats with  $L_H < 8$  m propelled exclusively by manual means.
- Type II Powered boats with  $L_H < 8$  m with a power  $\leq 4,5$  kW.
- Type III Canoes and kayaks with  $L_H < 8$  m.
- Type IV Sail boats with  $L_H < 8$  m with a sail area  $\leq 6$  m<sup>2</sup>.

ISO 6185-2:

- Type V Powered boats with  $L_H < 8$  m with power  $4,5$  kW <  $P \leq 15$  kW
- Type VI Sail boats with  $L_H < 8$  m with sail area > 6 m<sup>2</sup>.

This document (ISO 6185-3):

- Type VII Powered boats with  $L_H < 8$  m in design category C or D with power  $\geq 15$  kW.
- Type VIII Powered boats with  $L_H < 8$  m in design category B with power  $\geq 15$  kW.

ISO 6185-4:

- Type IX Powered boats (design categories C and D) with  $8$  m <  $L_H \leq 24$  m with power  $\geq 15$  kW.
- Type X Powered boats (design category B) with  $8$  m <  $L_H \leq 24$  m with power  $\geq 75$  kW.

NOTE ISO 6185-4 applies only to rigid inflatable boats with  $8$  m <  $L_H \leq 24$  m. For non-rigid inflatables with a length of hull in this range, this document can be applied.

# Inflatable boats —

## Part 3:

# Boats with a length of the hull less than 8 m with a motor power rating of 15 kW and greater

## 1 Scope

This document specifies the minimum safety characteristics required for the design, materials, manufacture and testing of inflatable boats and rigid inflatable boats with a length of the hull  $L_H$  in accordance with ISO 8666 less than 8 m with a motor power rating of 15 kW and greater.

This document is applicable to the following types of boats intended for use within the operating temperatures of  $-20\text{ °C}$  to  $+60\text{ °C}$ :

- Type VII: Powered boats, fitted with a buoyancy tube on the port and starboard sides, suitable for navigation in conditions of design categories C and D.
- Type VIII: Powered boats, fitted with a buoyancy tube on the port and starboard sides, suitable for navigation in conditions of design category B.

This document excludes single-chambered boats and boats with tubes made from unsupported materials, and does not apply to aquatic toys and inflatable liferafts.

Boats with tubes made from aluminium, roto-moulded polyethylene, fibre reinforced plastic or other rigid materials are excluded from this document.

## 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, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 2411, *Rubber- or plastics-coated fabrics — Determination of coating adhesion*

ISO 3011, *Rubber- or plastics-coated fabrics — Determination of resistance to ozone cracking under static conditions*

ISO 4674-1, *Rubber- or plastics-coated fabrics — Determination of tear resistance — Part 1: Constant rate of tear methods*

ISO 4675, *Rubber- or plastics-coated fabrics — Low-temperature bend test*

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

ISO 8099-1, *Small craft — Waste systems — Part 1: Waste water retention*

ISO 8099-2, *Small craft — Waste systems — Part 2: Sewage treatment systems*

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

ISO 8847, *Small craft — Steering gear — Cable over pulley systems*

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- ISO 8848, *Small craft — Remote mechanical steering systems*
- ISO 9093, *Small craft — Seacocks and through-hull fittings*
- ISO 9094, *Small craft — Fire protection*
- ISO 10087, *Small craft — Craft identification — Coding system*
- ISO 10088, *Small craft — Permanently installed fuel systems*
- ISO 10239, *Small craft — Navigation lights — Installation, placement and visibility*
- ISO 10592, *Small craft — Remote hydraulic steering systems*
- ISO 11105, *Small craft — Ventilation of petrol engine and/or petrol tank compartments*
- ISO 11591, *Small craft — Field of vision from the steering position*
- ISO 11592-1, *Small craft — Determination of maximum propulsion power rating using manoeuvring speed — Part 1: Craft with a length of hull less than 8 m*
- ISO 11812, *Small craft — Watertight or quick-draining recesses and cockpits*
- ISO 12215-1, *Small craft — Hull construction and scantlings — Part 1: Materials: Thermosetting resins, glass-fibre reinforcement, reference laminate*
- ISO 12215-2, *Hull construction and scantlings — Part 2: Materials: Core materials for sandwich construction, embedded materials*
- ISO 12215-3, *Small craft — Hull construction and scantlings — Part 3: Materials: Steel, aluminium alloys, wood, other materials*
- ISO 12215-5, *Small craft — Hull construction and scantlings — Part 5: Design pressures for monohulls, design stresses, scantlings determination*
- ISO 12216:2020/Amd 1:2022, *Small craft — Windows, portlights, hatches, deadlights and doors — Strength and watertightness requirements — Amendment 1*
- ISO 12217-1:2022, *Small craft — Stability and buoyancy assessment and categorization — Part 1: Non-sailing boats of length of the hull greater than or equal to 6 m*
- ISO 13297, *Small craft — Electrical systems — Alternating and direct current installations*
- ISO 13929, *Small craft — Steering gear — Geared link systems*
- ISO 14945, *Small craft — Builder's plate*
- ISO 14946, *Small craft — Maximum load capacity*
- ISO 15084, *Small craft — Anchoring, mooring and towing — Strong points*
- ISO 15085:2003/Amd 2:2017, *Small craft — Man-overboard prevention and recovery — Amendment 2*
- ISO 16315, *Small craft — Electric propulsion system*
- ISO 21487, *Small craft — Permanently installed petrol and diesel fuel tanks*
- ISO 23411, *Small craft — Steering wheels*
- ISO 25197, *Small craft — Electrical/electronic control systems for steering, shift and throttle*
- EN 314-2, *Plywood – Bonding quality – Part 2: Requirements*



### 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

##### **inflatable boat**

boat achieving all or part of its intended shape and buoyancy by *inflatable buoyancy tube* (3.5) or *foam-filled buoyancy tubes* (3.6)

#### 3.2

##### **rigid inflatable boat**

##### **RIB**

*inflatable boat* (3.1) achieving all or part of its intended shape by means of a lower part formed by a rigid structure and an upper, non-rigid, *inflatable buoyancy tube* (3.5) and/or *foam-filled buoyancy tube* (3.6)

#### 3.3

##### **buoyancy**

volume of all chambers which form the inflatable hull, plus any other buoyant component which is permanently fixed to it

Note 1 to entry: The term “permanently fixed” implies detachment is only possible by the use of tools.

#### 3.4

##### **total buoyant volume**

$V$

buoyancy comprising the buoyant volumes of the *inflatable buoyancy tube* (3.5) and the *foam-filled buoyancy tube* (3.6) added to the *permanent inherent buoyancy* (3.7) added to the *permanent sealed buoyancy* (3.8) added to the inherent buoyancy of the rigid parts of the boat

#### 3.5

##### **inflatable buoyancy tube**

tube on both port and starboard sides of the hull when the boat is in use, and inflated with air

#### 3.6

##### **foam-filled buoyancy tube**

buoyancy tube on both port and starboard sides of the hull when the boat is in use, and filled with closed cell foam

#### 3.7

##### **permanent inherent buoyancy**

buoyancy provided by materials, contained within the rigid hull and cockpit

#### 3.8

##### **permanent sealed buoyancy**

buoyancy provided by sealed chambers, contained within the rigid hull and cockpit, filled with air

#### 3.9

##### **crew limit**

##### **CL**

maximum recommended number of persons to be carried when the boat is underway

Note 1 to entry: See [Clause 10](#) for information to be displayed on the builder’s plate.

**3.10**

**design category**

description of the sea and wind conditions for which a boat is assessed to be suitable

Note 1 to entry: See ISO 12217-1, ISO 12217-2 and ISO 12217-3 for the description of design categories.

**3.11**

**high-speed boat**

motor boat having a maximum speed, in knots, greater than  $7 \times \sqrt{L_H}$  or 25 knots, whichever is the greater

Note 1 to entry: 1 knot = 1,852 km/h.

**3.12**

**seat**

any surface, horizontal or nearly horizontal, where a person may sit

**3.13**

**lifting the boat**

procedure for raising a boat by strong points, usually for attaching to crane or davit

**3.14**

**motor**

all types of motor or engine, whether electric, internal combustion or otherwise

Note 1 to entry: In this document, “engine” refers only to internal combustion engines.

**4 Symbols and abbreviated terms**

Symbol	Designation	Unit
$A_{LV}$	windage area of the hull in profile at the appropriate loading condition	m <sup>2</sup>
$B_{CL}$	the maximum transverse distance between outboard extremities of any parts of the crew area, corresponding to the centrelines of the tubes' cross-sectional area	m
$B_H^a$	beam of the hull, measured with the inflatable tubes inflated to nominal pressure	m
$B_{IVT}$	beam between inner vertical tangent of tubes	m
CL	crew limit	—
$d$	maximum tube diameter, measured within the straight sections of the buoyancy tube section	mm
$F_M$	material factor for boats that are designed to be lifted	—
$F_s$	minimum force to assess seam strength	N
$F_t$	tear resistance force	N
$L_H^a$	length of the hull, measured with the inflatable tubes inflated to nominal pressure	m
$L_{STS}$	length of the sample buoyancy tube section	m
$L_T$	total length of the buoyancy tube on all sides of the boat	m
$m_{LDC}$	mass of the boat in the maximum load condition <sup>a</sup>	kg
$m$	mass of a constituent part of the boat	kg
$m_T^a$	mass when towed on a trailer	kg
$N$	number of buoyancy chambers	—

<sup>a</sup> Definition provided in ISO 8666:2020.

<sup>b</sup> 1 bar = 0,1 MPa = 10<sup>5</sup> Pa; 1 MPa = 1 N/mm<sup>2</sup>.

Symbol	Designation	Unit
$p$	nominal pressure at 20 °C	bar <sup>b</sup>
$\rho$	density of material	kg/m <sup>3</sup>
$V$	total buoyant volume of the boat	m <sup>3</sup>
$v$	volume of a constituent part of the boat	m <sup>3</sup>
$V_c$	volume of each chamber	m <sup>3</sup>
$V_T$	total volume of the buoyancy tube	m <sup>3</sup>
<sup>a</sup> Definition provided in ISO 8666:2020. <sup>b</sup> 1 bar = 0,1 MPa = 10 <sup>5</sup> Pa; 1 MPa = 1 N/mm <sup>2</sup> .		

## 5 Construction and structural requirements

### 5.1 Structural materials

#### 5.1.1 General

For construction and structural assessment, the general requirements in ISO 12215-1, ISO 12215-2 and ISO 12215-3 shall apply.

For flexible floor and buoyancy tube materials, the requirements specified in 5.1.2 shall apply. For plywood parts, the requirements specified in 5.1.3 shall apply.

#### 5.1.2 Materials forming the flexible floor and buoyancy tube

##### 5.1.2.1 Requirements

All flexible floor and buoyancy materials shall meet the requirements stipulated in 5.1.2.2 and shall retain their full serviceability within the operating temperature range of -20 °C to +60 °C.

##### 5.1.2.2 Test methods

###### 5.1.2.2.1 Sampling

Carry out the test with test pieces taken from the materials prior to manufacturing the boat. If the boats are vulcanized during manufacture, the test pieces shall also be vulcanized.

###### 5.1.2.2.2 Resistance to liquids

Carry out the test in accordance with ISO 1817 on the external side of the material using IRM 901 oil (A) and salt water (B) as specified in Table 1.

In both cases (A) and (B), the change in mass per unit area shall not exceed 100 g/m<sup>2</sup> following the stipulated period of contact with the test liquid at a temperature of 70 °C ± 2 °C.

**Table 1 — Duration of tests**

Parameter	A	B
Test liquid	IRM 901 oil <sup>a</sup>	Salt water <sup>b</sup>
Period of contact (hours)	(22 ± 0,25)	≥ 336
<sup>a</sup> IRM 901 oil has replaced ASTM oil No. 1. <sup>b</sup> Components of salt water: distilled water +30 g of sodium chloride per litre.		

#### 5.1.2.2.3 Resistance to ozone

Carry out the test as specified in ISO 3011 on the external face of the material in contact with the ambient environment as specified below:

- Exposure time: 72 h
- Temperature of test: 30 °C ± 2 °C
- Concentration: a volume fraction of  $0,5 \times 10^{-6}$
- Mandrel diameter: five times the material thickness

There shall be no signs of cracking on completion of the test when test samples are examined under 10 × magnification.

#### 5.1.2.2.4 Resistance to cold

The material shall satisfy the requirements of ISO 4675 at a temperature of –20 °C.

#### 5.1.2.2.5 Tear strength

Carry out the test as specified in ISO 4674-1, method B.

The minimum value of tear resistance,  $F_t$ , in newtons, is given by [Formula \(1\)](#):

$$F_t = 0,375 d (1,14 p + 0,14) \quad (1)$$

In all cases,  $F_t$  shall be not less than 75 N.

#### 5.1.2.2.6 Coating adhesion

Prepare and carry out the test on the material in accordance with ISO 2411 at room temperature and a machine rate of 100 mm/min ± 10 mm/min. The minimum adhesion value shall be 40 N per 25 mm.

#### 5.1.2.2.7 Seam strength testing of buoyancy chambers

Join two pieces of the material together in the same manner as used in the boat construction (method, material, dimensions) to form a 50 mm-wide test piece. Apply the minimum seam force,  $F_s$ , at 60 °C over a period of 4 h. Where more than one method of seam construction is used in the manufacture of the boat, carry out the test for each method.

The minimum seam force,  $F_s$ , in newtons, is given by [Formula \(2\)](#):

$$F_s = 3,75 d (1,14 p + 0,14) \quad (2)$$

There shall be no slipping or other failure at any part of the seam.

### 5.1.3 Wood

#### 5.1.3.1 General requirements

Wood parts contributing to the integrity of the boat shall comply with requirements specified in ISO 12215-3 and ISO 12215-5.

#### 5.1.3.2 Plywood

In addition to the general requirements in [5.1.3.1](#), plywood parts contributing to the integrity of the boat shall conform to requirements of EN 314-2.