INTERNATIONAL STANDARD

ISO 6185-3

Second edition
2014-08-15

Inflatable boats —

Part 3: Boats with a hull length less than 8 m with a motor rating of 15 kW and greater

Bateaux pneumatiques —

Partie 3: Bateaux d'une longueur de coque inférieure à 8 m et d'une puissance moteur assignée supérieure ou égale à 15 kW

Reference number
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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).

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

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 188, *Small craft*.

This second edition cancels and replaces the first edition (ISO 6185-3:2001), which has been technically revised.

ISO 6185 consists of the following parts, under the general title *Inflatable boats*:

— *Part 1: Boats with a maximum motor power rating of 4, 5 kW*

— *Part 2: Boats with a maximum motor power rating of 4, 5 kW to 15 kW inclusive*

— *Part 3: Boats with a hull length less than 8m and with a motor power rating of 15 kW and greater*

— *Part 4: Boats with a hull length of between 8 m and 24 m and with a maximum motor power rating of 15 kW and greater*

Introduction

ISO 6185 is subdivided into four parts as shown in Figure 1. It excludes:

— single-chambered boats;

— boats < 1 800 N buoyancy; and

— boats made from unsupported materials > 12 kN inflated buoyancy and powered by motors > 4, 5 kW.

It is not applicable to:

— aquatic toys; and

— 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 ≤ 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 ≤ 6 m^2.

ISO 6185-2:

— Type V Powered boats with L_H < 8 m with power 4,5 kW < P ≤ 15 kW

— Type VI Sail boats with L_H < 8 m with sail area > 6 m^2.

ISO 6185-3:

— Type Vll Powered boats with L_H < 8 m with power ≥ 15 kW.

— Type Vlll Powered boats with L_H < 8 m with power ≥ 75 kW.

ISO 6185-4:

— Type IX Powered boats (design categories C and D) with 8m < L_H ≤ 24 m with power ≥ 15 kW.

— Type X Powered boats (design category B) with 8m < L_H ≤ 24 m with power ≥ 75 kW.

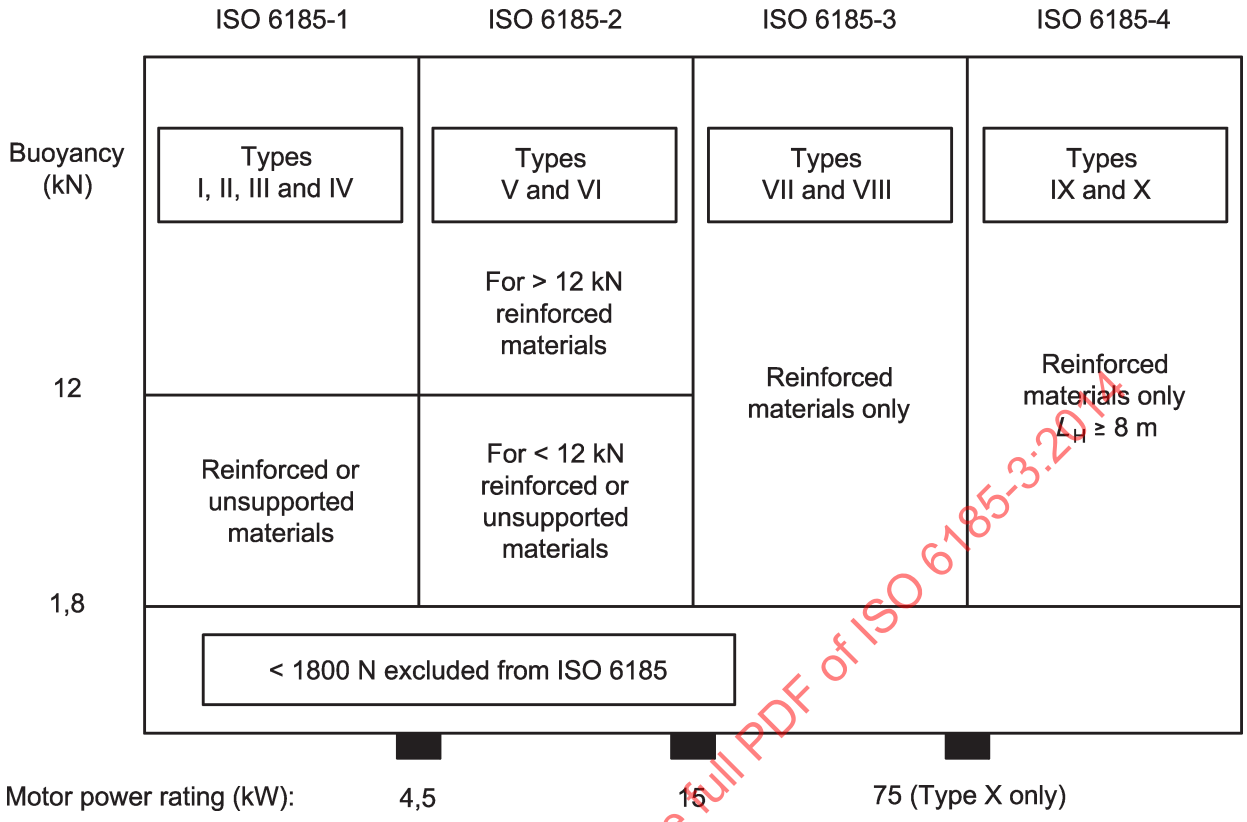


Figure 1 — Illustration of how ISO 6185 is sub-divided

This document enables the boat to be assigned to a design category appropriate to its design and maximum load. The categories used align with those in the Recreational Craft Directive of the European Union, EU Directive 94/25/EC, as amended by Directive 2003/44/EC.

Inflatable boats —

Part 3:
Boats with a hull length less than 8 m with a motor rating of 15 kW and greater

1 Scope

This part of ISO 6185 specifies the minimum safety characteristics required for the design, materials to use, manufacture and testing of inflatable boats and rigid inflatable boats with a hull length L_H in accordance with ISO 8666 less than 8 m with a motor power rating of 15 kW and greater.

This part of ISO 6185 is applicable to the following types of boats intended for use within the operating temperatures of – 20 °C to + 60 °C:

— Type VII: Powered Boats fitted with a buoyancy tube attached to the port and starboard sides, suitable for navigation in conditions of Design Categories C and D and capable of installing motor power rating of 15 kW and greater.

— Type VIII: Powered Boats fitted with a buoyancy tube attached to the port and starboard sides, suitable for navigation in conditions of Design Category B capable of installing motor power rating of 75kW and greater.

NOTE 1 General arrangements of typical boats of Types VII and VIII are given in Annexes A and B, respectively.

This part of ISO 6185 excludes single-chambered boats and boats made from unsupported materials, and is not applicable to aquatic toys and inflatable liferafts.

NOTE 2 For craft, concerned by the Recreational Craft Directive (RCD) of the European Union, fitted with inboard engines with nonstandard integral exhausts, noise emission requirements need to be considered.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 314-2, *Plywood - Bonding quality - Part 2: Requirements*

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 3864-1, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs and safety markings*

ISO 4674-1:2003, *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 6185-4:2011, *Inflatable boats — Part 4: Boats with a hull length of between 8 m and 24 m with a motor power rating of 15 kW and greater*

ISO 8099, *Small craft — Toilet waste retention systems*

ISO 8666, *Small craft — Principal data*

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

ISO 8848, *Small craft — Remote steering systems*

ISO 9093, *Small craft — Seacocks and through-hull fittings*

ISO 9094,*Small craft — Fire protection*

ISO 9775, *Small craft — Remote steering systems for single outboard motors of 15 kW to 40 kW power*

ISO 10087, *Small craft — Craft identification — Coding system*

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

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

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

ISO 10240, *Small craft — Owner's manual*

ISO 10592, *Small craft — Hydraulic steering systems*

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

ISO 11547, *Small craft — Start-in-gear protection*

ISO 11592, *Small craft less than 8 m length of hull — Determination of maximum propulsion power rating*

ISO 11812:2001, *Small craft — Watertight cockpits and quick-draining cockpits*

ISO 12215-3:2002, *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, *Small craft — Windows, portlights, hatches, deadlights and doors — Strength and watertightness requirements*

ISO 12217-1:2013, *Small craft — Stability and buoyancy assessment and categorization — Part 1: Non-sailing boats of hull length greater than or equal to 6 m*

ISO 12217-3:2013, *Small craft — Stability and buoyancy assessment and categorization — Part 3: Boats of hull length less than 6 m*

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

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[1)]*Small craft — man overboard prevention and recovery*

ISO 15652, *Small craft — Remote steering systems for inboard mini jet boats*

1) Under revision

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

3 Terms and definitions

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

3.1
inflatable boat
buoyant structure (hull), achieving all or part of its intended shape and buoyancy by the medium of inflation and which is intended for the transportation of people and/or loads on the water, and where the design and shape of it gives it the capability of withstanding forces and movements arising from sea conditions

3.2
rigid inflatable boat
buoyant structure comprising two essential parts: a lower hull formed by a rigid structure achieving part of its intended shape and a non-rigid buoyancy tube(s) that is of either inflatable or foam-filled type and where the volume of the buoyancy tube(s) comprises not less than 50 % of the total required buoyant volume of the boat (3.4)

Note 1 to entry: Tubes made from rigid aluminium, rotomoulded polyethylene, GRP or other rigid materials are excluded.

3.3
buoyancy of an inflatable boat
buoyancy 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
multi-chambered tube attached to the length of 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 attached to the length of both port and starboard sides of the hull when the boat is in use, and filled with resilient closed cell type foam

Note 1 to entry: For material requirements, see 5.7.

3.7
permanent inherent buoyancy
buoyancy provided by non-intercellular (closed cell) foam or other materials, contained within the rigid hull and cockpit, which are less dense than fresh water

Note 1 to entry: For material requirement see ISO 12217-1:2013, Annex F.

3.8
permanent sealed buoyancy
buoyancy provided by sealed compartments, contained within the rigid hull and cockpit, filled with air

Note 1 to entry: For requirements see ISO 12217-1:2013, Annex F reference air containers.

3.9
reinforced materials
materials which have a coated base cloth

3.10
inboard area
internal surface area defined by a vertical plane tangential to the innermost side of the buoyancy tube

3.11
crew limit
maximum number of persons to be carried when the boat is underway, as displayed on the builder's plate

3.12
design category
description of the sea and wind conditions for which a boat is assessed to be suitable

Note 1 to entry: The definitions of these design categories align with those used in the Recreational Craft Directive of the European Union, EU Directive 94/25/EC as amended.

3.12.1
design category B "offshore"
designed for offshore voyages where conditions up to and including wind force 8 and significant wave heights up to and including 4 m can be experienced

3.12.2
design category C "inshore"
designed for voyages in coastal waters, large bays, estuaries, lakes and rivers where conditions up to and including wind force 6 and significant wave heights up to and including 2 m can be experienced

3.12.3
design category D "sheltered waters"
designed for voyages in sheltered coastal waters, small bays, small lakes, rivers, and canals when conditions up to and including wind force 4 and significant wave heights up to and including 0,3 m can be experienced, with occasional waves of 0,5 m maximum height, for example from passing vessels

4 Symbols

Unless specifically otherwise defined, the symbols and units used in this part of ISO 6185 are given in Table 1.

Table 1 — Symbols, abbreviated terms and units

Symbol	Designation	Unit	Clause
A_{LV}	windage area of the hull in profile at the appropriate loading condition	m^2	7.3
B_H	beam of the hull, measured in compliance with ISO 8666 with the inflatable tubes inflated to nominal pressure	m	7.3 7.5
CL	crew limit, see 3.11		7.2
d	maximum tube diameter, measured within the straight sections of the buoyancy tube section	mm	5.2.2.5 5.2.2.7
F(d)	dimensional factor		8.1
F_t	tear resistance force	N	5.2.2.5
F_s	static load force	N	5.2.2.7
[a] 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm2.			

Table 1 *(continued)*

Symbol	Designation	Unit	Clause
L_H	length of the hull, measured in compliance with ISO 8666 with the inflatable tubes inflated to nominal pressure	m	Introduction, 7.3
L_{WL}	waterline length of the hull, measured in compliance with ISO 8666	m	Table 3 7.3.1
m_{LDC}	mass of the fully loaded boat as defined in ISO 8666	kg	8.2.2 8.3.2.3 8.5.2 8.7.3
M_{MO}	mass of the minimum operating condition of the boat in accordance with ISO 12217-1	kg	6.15
N	number of buoyancy compartments	Unit	7.5
p	nominal pressure at 20°C	bar [a]	5.2.2.5 5.2.2.7
V	total buoyant volume (see 3.4) of the boat	m^3	7.4
V_c	volume of each compartment	m^3	7.5
V_T	volume of the buoyancy tube	m^3	7.5

[a] 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm2.

5 Structural Materials

5.1 General

All materials shall be selected according to the stresses to which the boat is to be subjected (shape, dimensions, maximum load, installed power, etc.), and also to the intended service conditions. Use under normal seagoing conditions shall not materially impair their performance and they shall meet the following requirements.

5.2 Materials making up the flexible floor and buoyancy tube

5.2.1 Requirements

All materials contributing to the integrity of the boat shall meet the requirements stipulated below and shall retain their full serviceability within the operating temperature range of – 20 °C to + 60 °C.

5.2.2 Test methods

5.2.2.1 Sampling

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

5.2.2.2 Resistance to liquids

Carry out the test in accordance with ISO 1817 on the external side or the sides of the material in contact with the liquid using IRM 901 oil (A) and salt water (B) as specified in Table 2.

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

Table 2 — Duration of Test

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

5.2.2.3 Resistance to ozone

Carry out the test as specified in ISO 3011 on the external face of the fabric 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: 5 times the material thickness

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

5.2.2.4 Resistance to cold

All materials shall satisfy the requirements of ISO 4675 at a temperature of – 20 °C.

5.2.2.5 Tear strength

Carry out the test as specified in ISO 4674-1:2003, method B.

The minimum value of tear resistance, in Newton's, is given by:

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

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

5.2.2.6 Coating adhesion

Prepare and carry out the test 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.

5.2.2.7 Seam strength testing of buoyancy chambers

Join two pieces of material together in the same manner as used in the boat construction (method, material, dimensions) to form a 50 mm wide test piece. Apply a static load 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 value of F_s is given by:

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

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

5.3 Wood

5.3.1 General

The types of timber and plywood shall comply with ISO 12215-3.

All exposed timber and plywood shall be given weather-tight protection, such as paint, varnish or preservative, suitable for a marine environment.

In the selection of protective coatings, national, regional and international regulations for the protection of the environment shall be followed.

5.3.2 Plywood

Plywood used may incorporate hardwoods or softwood plies and the bonding adhesive shall be water- and boil- proof and comply with EN 314-2 or equivalent.

If the wood used for plies is not hardwood, the plies shall be treated to give protection against rot, fungal decay and marine borers, and/or reinforced (laminate), where necessary.

All adjoining edges and/or surfaces, including any end grain, shall be effectively sealed.

Timber used shall be seasoned and free from sapwood, decay, insect attack, splits and other imperfections likely to adversely affect the performance of the material. The timber shall be generally free from knots but an occasional sound intergrown knot is acceptable.

5.3.3 Constructional timbers

Timber used in the construction shall be seasoned, and free from sapwood, shakes and other defects.

5.4 Metal parts

The types of metals shall comply with the requirements of Clause 4 of ISO 12215-3:2002.

5.5 Glass-reinforced plastics

Resins, reinforcements and laminates shall be arranged and protected against effects of the marine environment to comply with the requirements of 7.12.

5.6 Other materials

Parts other than metal or wood shall comply with the requirements of Clause 6 of ISO 12215-3:2002.

5.7 Buoyant material used in foam filled buoyancy tubes

5.7.1 General

Buoyant materials used in foam filled buoyancy tubes shall comply with the tests prescribed in 5.7.2

5.7.2 Tests

5.7.2.1 General

Ten samples of the buoyant material shall be subject to tests prescribed in 5.7.2.2 to 5.7.2.4. They shall be at least 300 mm^2 and of the same thickness as used in the buoyancy tube.

The dimensions of the samples shall be recorded at the end of the 10 day cycle.

The samples shall be carefully examined at the end of the tests and shall not show any sign of external change of structure or of mechanical properties. Furthermore, 2 of the samples shall be cut open and shall not show any sign of internal change of structure.

Six of the samples shall be used for the water absorption test in 5.7.2.3, two of which shall be so tested after they have been subjected to the fuel resistance test in 5.7.2.4

The results shall state the mass in kilograms which each sample can support out of the water after one and seven days immersion (the selection of a test method suitable for obtaining this result directly or indirectly is left to the discretion of the testing body). The reduction of buoyancy shall not exceed 16 % for samples which have been exposed to the diesel oil conditioning and shall not exceed 5 % for all other samples. The samples shall show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities.

5.7.2.2 Tests for stability under temperature cycling

Six samples shall be alternately subjected for 8 h to surrounding temperatures of −30 °C and +65 °C. These alternating cycles need not follow immediately after each other and the following procedure, repeated for a total of 10 cycles is acceptable:

a) store the samples for 8 h at +65 °C, to be completed on the first day; and

b) remove the samples from the warm chamber that same day and leave them exposed under ordinary room conditions until the next day; and

c) store the samples in a cold chamber for 8 h at −30 °C, to be completed the second day; and

d) remove the samples from the cold chamber that same day and leave them exposed under ordinary room conditions until the next day;

Repeat the procedure until 10 cycles (a,b,c,d) has been reached.

5.7.2.3 Tests for water absorption

The tests shall be carried out in fresh water and the sample shall be immersed for seven days under a 1,25 m head of water.

The tests shall be carried out on:

a) 2 samples as supplied; and

b) 2 samples which have been subjected to the temperature cycling as prescribed in 5.7.2.2; and

c) 6 samples which have been subjected to the temperature cycling as prescribed in 5.7.2.2 followed by the fuel resistance test prescribed in 5.7.2.4.

5.7.2.4 Fuel resistance test

The six samples to be tested shall be immersed horizontally for a period of 24 h under a 100 mm head of the following fuels at ambient temperature:

— 2 samples under any type of diesel fuel;

— 2 samples under any type of petrol;

— 2 samples under any type of biofuel.

After this test, the samples shall show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities.

6 Functional components

NOTE See Bibliography for details of International Standards developed under ISO/TC I88 for components not listed below.

6.1 Conditioning

All tests of functional components shall be performed at a temperature of 20 °C ± 3 °C.

6.2 Fittings bonded to the flexible parts of the boat

6.2.1 General

The materials and method of construction used shall be compatible with that of the buoyancy tube and hull themselves. Any load-bearing fitting, attached to the boat (see 3.1 and 3.2) shall not, when loaded as described in 6.2.2, result in any impairment in airtightness or water integrity.

6.2.2 Test method

Any cordage used for test purposes shall have a diameter of 8 mm.

Gradually load the fittings in any direction up to the load required below and maintain this load for 1 min.

a) Strong points required by ISO 15084: in accordance with that standard.

b) All other attachments: up to 2 kN.

6.3 Manual lifting and carrying devices

6.3.1 Requirement

Boats with a buoyancy less than 9 000 N shall be equipped with a means of carrying it. The fitting of lifting and carrying devices on boats with a buoyancy of 9 000 N or greater is optional. There shall be no failure of the device when tested as described in 6.3.2.

6.3.2 Test method

Any cordage used for test purposes shall have a diameter of 8 mm.

Gradually load the device with a force of 1500 N for 60 s in the appropriate directions.

Where lifting or carrying devices also function as safety ropes or grab handles, they shall also conform to the requirements of 7.9.

6.4 Valves (if applicable)

6.4.1 Inflation

The assemblies shall be made of corrosion-resistant materials and shall not be capable of damaging the boat materials.

The type and arrangement of the inflation valves fitted to an inflatable boat shall ensure that:

a) the valves are readily accessible for connection of the inflation device whether the boat is on land or in the water;

b) the valves do not inconvenience the persons in their predetermined seating positions;

c) the valves do not interfere with the operation of the boat;

d) the valves do not interfere with loading and unloading of the boat;

e) the valves cannot be damaged or torn off by lines, safety ropes or movable components of the boat construction or by normal movements of the passengers and load;

f) the valves are equipped with a cap that can independently seal the valve and that the cap is connected to the valve in a secure manner that prevents it from being accidentally lost;

g) a controlled reduction in buoyancy chamber pressure and of measuring that pressure is possible.

6.4.2 Deflation

Deflation of the hull and tubes shall be by manual operation, either by using the inflation valve or by using a separate device.

Where separate devices are fitted then these shall be made of corrosion-resistant materials and shall not be capable of damaging the boat material. The design and location of such devices shall meet the requirements of 6.4.1 a) to g) inclusive.

The deflation of any one compartment shall not cause a loss of air from any of the remaining compartments.

6.5 Rowlocks and oars

6.5.1 Requirements

The provision of rowlocks and oars is not mandatory. If they are provided as standard or optional equipment, they shall meet the requirements, given in 6.5.2 to 6.5.5.

6.5.2 Abrasion damage

The bearing surfaces of the oars and rowlocks shall be free from any roughness likely to cause wear. All external surfaces of the rowlock shall be smooth and free from sharp edges and corners likely to cause damage when the boat is packed.

6.5.3 Prevention from loosening

Rowlocks shall be secured against unintended loosening. Means shall be provided for the storage of two oars or paddles.

6.5.4 Strength of rowlocks

6.5.4.1 Requirement

There shall be no structural failure of the rowlock or associated fittings when tested as described in 6.5.4.2.

6.5.4.2 Test method

Any cordage used for test purposes shall have a diameter of 8 mm.

Load the rowing fitting, including the rowlock, with a force of 500 N for 1 min in any horizontal direction.

6.5.5 Use of the rowlocks and oars

When tested as described in 8.5, there shall be no structural failures or permanent deformation of any component during the test and it shall be clearly demonstrated that the rowlock system is rigid enough for efficient rowing.

A minimum unrestricted movement of the oars shall be 60° ahead and 60° astern.

6.6 Transom (where applicable)

6.6.1 Requirement

The transom or motor mount and its attachment to the boat shall be designed to withstand, under normal use, the maximum stresses arising from:

— the output power and torque of the motor(s); and

— the mass of such motor(s).

NOTE ISO 12215-6 gives recommendations on transoms of outboard engines.

6.7 Hull drainage

If the boat is fitted with a transom, it shall be equipped with at least one drainplug or one bailing system.

For boats fitted with an integral closed hull/cockpit assembly which is not filled with closed-cell foam or equivalent, a facility shall be provided for draining the interior part of the hull (bilge).

Means to prevent the accidental discharge of oily waste shall be provided.

6.8 Remote steering system (where offered as standard or optional equipment)

Any remote steering system shall conform to at least one of the following standards: ISO 8847, ISO 8848, ISO 9775, ISO 10592 and ISO 15652.

For boats fitted with a single inboard engine and remote steering systems, a manual means of emergency steering at reduced speed shall be provided (for example, an oar, a paddle or other means)

Type VIII boats shall be fitted with a remote steering system approved by the boat manufacturer.

If remote steering and control consoles are fitted, these structures shall meet the strength requirements of 7.13.

6.9 Towing, anchoring and mooring devices

All boats shall have towing, anchoring and mooring devices in accordance with ISO 15084.

6.10 Seating and attachment systems (where offered as a standard or optional equipment)

Seat is any surface, horizontal or nearly horizontal, where a person may sit.

Where a seat structure (s) is supplied and permanently fitted to the boat by means of an attachment system, the seat and the attachment system shall meet the strength requirements of subclause 7.13.

Type VIII boats shall have a seat structure and attachment system for each person up to the crew limit (CL) for operation in Design Categories B. Buoyancy tubes shall not be used for seating areas except when operating in Design Categories C and D.

Seating and handholds for Type VIII boats shall provide support for the upright posture for each person up to the crew limit (CL) and be designed to prevent them from falling or being thrown on deck.

Un-cushioned locker tops or benches shall not be accepted as seats for operation in Design Category B.

NOTE With respect to falling overboard, see 7.9.

6.11 Electrical installations (where offered as standard or optional equipment))

Any electrical installations shall conform to the requirements of ISO 10133 or ISO 13297, as applicable.

Type Vlll boats shall be fitted with an electrical system.

6.12 Engine and engine spaces

6.12.1 Inboard engines

For boats fitted with inboard engine (s), these shall be installed in an enclosure separated from living quarters in a manner to minimize the risk of fire and spread of fires as well as the hazards from toxic fumes, heat, noise or vibration.

Parts of the engine that need frequent inspection and/or servicing shall be readily accessible.

The material used for sound insulation inside engine spaces shall present a non-fuel absorbent surface towards the engine and shall not sustain combustion as specified in ISO 9094.

Permanently-installed fuel systems and fixed fuel tanks shall conform to ISO 10088 and ISO 21487.

Type VIII boats shall be fitted with a permanent fuel system including permanent fuel tank(s).

6.12.2 Outboard engines

Outboard engines shall be installed in accordance with manufacturer's instructions.

All outboard engines shall have a device to prevent starting in gear in accordance with ISO 11547, except if a throttle limiting device is fitted to limit the thrust to 500 N at the time of starting the engine.

6.13 Fuel systems

Permanently-installed fuel systems and fixed fuel tanks shall conform to ISO 10088 and ISO 21487.

Type VIII boats shall be fitted with a permanent fuel system including permanent fuel tank(s).

6.14 Ventilation of petrol engine and/or petrol tank compartments (where applicable)

Ventilation of free spaces greater than 1,5 dm^3 in petrol engine and/or petrol tank compartments shall conform to ISO 11105.

6.15 Devices for lifting the boat (if applicable)

Lifting attachment components that are permanently fitted to the cockpit and transom and lifting slings (if supplied as standard or optional equipment) shall be:

— designed to withstand together, in the boats intended lifting configuration, the force induced when lifting at least 5 × m_{MO};

— tested to withstand together, in the boats intended lifting configuration, the force induced when lifting at least 2 × m_{MO};

— free from signs of permanent deformation or structural failure to the lifting device, its fastening elements or the supporting and surrounding structure immediately after the test.

Alternatively lifting attachments may be proven to pass such test by direct calculation.

The use of lifting devices and their associated fittings such as straps, lifting slings, shall be described in the owner's manual.

6.16 Fire protection (if applicable)

Boats shall comply with ISO 9094.

6.17 Openings in hull, deck or superstructure

Windows, portlights, doors, hatch covers and other openings in the hull, cockpit and superstructures whose defect could lead to flooding the interior of the boat shall comply with ISO 12216.

Seacocks and thru hull fittings shall comply with ISO 9093.

6.18 Gas systems

Liquefied petroleum gas (LPG) systems for domestic use, where fitted, shall comply with ISO 10239.

6.19 Navigational lights

Navigation lights, where fitted, shall comply with international regulations and/or national regulations where applicable.

NOTE Guidance can also be found in ISO 16180.[2]

6.20 Discharge prevention

Boats shall be constructed so as to prevent the accidental discharge of pollutants (oil, fuel) overboard.

Boats fitted with permanently installed toilets shall be fitted with holding tanks or provision to fit holding tanks which shall comply with ISO 8099.

Any through hull piping for toilet discharge shall be fitted with seacocks complying with ISO 9093 and that can be secured in the closed position.

7 Safety requirements of the completed boat

7.1 Maximum Load Capacity

The maximum load capacity shall be determined according to ISO 14946 except that, stability and buoyancy tests or calculations shall be conducted according to 7.3 and 7.4 respectively.

7.2 Crew limit (CL)

The CL as defined in 3.11 shall not exceed the number of persons for which seating or seating spaces have been assigned or the limitations imposed by 7.3, 7.4, and 7.5.

For design categories C and D, the number of seating spaces may include the interior floor and buoyancy tubes, when these are used as seating areas, as well as fixed seats. Seats and seating areas shall meet the size requirements of ISO 14946.

For design category B, the number of seating spaces shall be limited to the number of fixed seats conforming to 6.10.

7.3 Static stability

7.3.1 Except as described in 7.3.2 for boats which are fully enclosed, the static stability shall comply with the sub-clauses of ISO 12217-1:2013 as specified in Table 3

Table 3 — Static Stability compliances

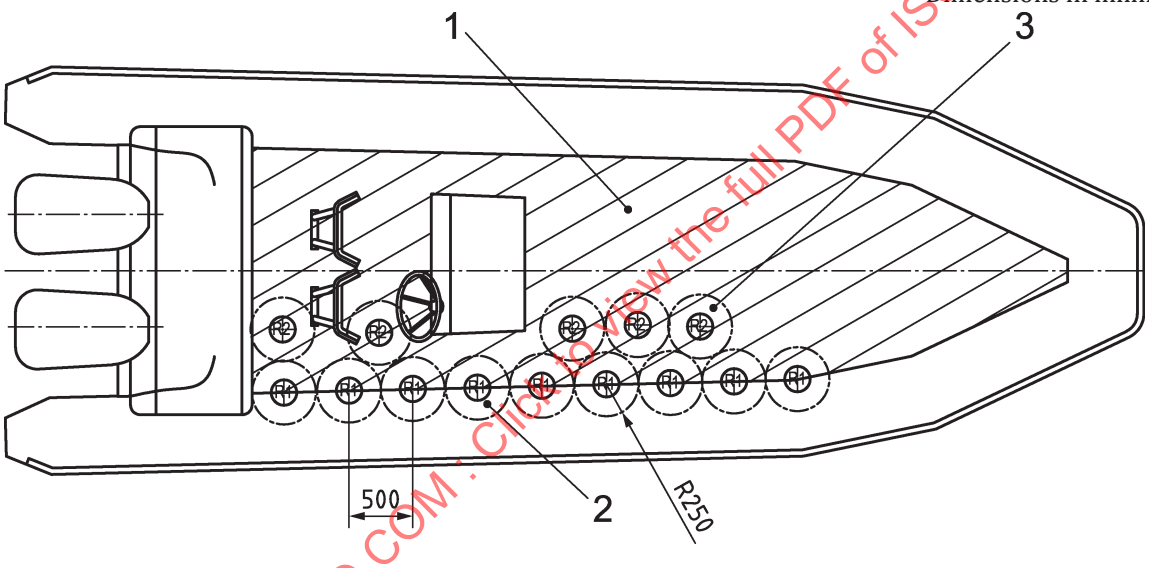
Boat Type	Type VII	Type VIII
Design Category	C and D	B
offset load	6.2	6.2
resistance to waves and wind	Not applicable	6.3.2 and 6.3.3
heel due to wind action	6.4a	Not applicable

[a] The application of 6.4 is only required for boats where $A_{LV} \geq 0{,}5\ L_{WL}\ B_H$

The offset load test shall be conducted with centre-of-gravity of the seated crew positioned 0,1 m above the top of the buoyancy tube and on the vertical tangent to the inboard face of the buoyancy tube as shown in Figure 2.

In conducting the offset load test, because the boat cannot sink if it complies with 7.4 below, the test does not have to be limited by the freeboard margin to water flooding over the buoyancy tube into the interior of the boat.

Dimensions in millimetres



Key

1 working deck bottom

2 outboard row of persons centred over vertical inboard tangent of buoyancy tube, minimum spacing 500 mm in any direction

3 inboard row of persons (example)

Figure 2 — Position of the seated crew

7.3.2 Instead of the requirements of 7.3.1, alternatively the stability and freeboard may be assessed using one of the following

a) options 1 or 2 of ISO 12217-1:2013 for boats with L_H greater than or equal to 6m, in which case all the requirements of the chosen option shall be applied, but 7.4.3 and 8.7 of this standard shall not apply; or

b) option 2 of ISO 12217-3:2013 for boats with L_H less than 6m, in which case all the requirements of the chosen option shall be applied, but 7.4.3 of this standard shall not apply.

7.4 Buoyancy requirements

7.4.1 Total buoyant volume

The total buoyant volume (V) in m^3 comprises:

a) For inflatable boats:

— all chambers which form the inflatable hull; and

— any other inflatable chamber which is permanently fixed to it. (3.3).

b) For rigid inflatable boats:

— the buoyancy of tubes (3.5 or 3.6); and

— permanent inherent buoyancy (3.7); and

— permanent sealed buoyancy (3.8); and

— inherent buoyancy of the rigid parts of the boat (For calculation see Annex D of ISO 12217-3:2013).

Inherent buoyancy (v) of the rigid parts of the boat can be calculated as:

$$v = \frac{m}{\rho}$$

where

v is the volume of an element, expressed in m^3;

m is the mass of that element, expressed in kg;

ρ is the density of that element, expressed in kg/m^3, as given in Table 4.

Table 4 — Material densities

Material	Density kg/m³
Aluminium alloys	2 700
GRP laminate	1 500
Flotation foam materials	40
Structural foam materials	80
Balsa core materials	150
Teak	640
Miscellaneous equipment	2 000
Diesel engines	5 000
Petrol engines	4 000
Outboard engines	3 000
plywood	600

The total buoyant volume in m^3 (V) shall be as follows:

$$V > \frac{k \times m_{LDC}}{1\,000}$$

Where k is:

— 1,33 for boats assessed to design category B;

— 1,2 for boats assessed to design category C;

— 1,1 for boats assessed to design category D.

As defined by 3.4, the total volume of the buoyancy tubes shall not comprise less than 50 % of the required total buoyant volume of the boat.

7.4.2 Buoyancy determination

Total buoyant volume shall be determined by measuring or calculating the volume of the closed cell foam buoyancy tubes, the volume of the inflatable buoyancy tubes and other inflatable elements at the nominal working pressure, permanent inherent buoyancy (3.7) and permanent sealed buoyancy (3.8) and inherent buoyancy of the rigid parts of the boat.

7.4.3 Level flotation when swamped

When the boat in the fully loaded condition is filled to overflowing with water, it shall float with not more than 10 degrees trim from the unswamped fully loaded waterline and with more than 2/3 (two thirds) of L_H above the water.

All compartments shall be filled with water during this test except for:

— buoyancy tubes (as defined in 3.5 or 3.6); or

— any other inflatable chamber (as defined in 3.3); or

— permanent inherent buoyancy (as defined in 3.7); or

— permanent sealed buoyancy (as defined in 3.8).

For this purpose the weight of the engine(s) shall correspond to the maximum engine power defined by the builder as given in Tables E.1 and E.2 in ISO 12217-1:2013.

This requirement may be demonstrated either by physical test or by calculation.

If using the physical test, vulnerable items such as engines may be replaced with an appropriate mass at the appropriate location as described below.

a) For outboard engines, Tables E.1 and E.2 in ISO 12217-1:2013 columns 2 and 4 give the appropriate replacement mass to be used with respect to engine power for petrol engines. A heavier mass may be used if it is recorded in the owner's manual. A mass of 86 % of the engine dry mass shall be used for diesel, jet-propulsor or electric outboards, if these are supplied as the standard outfit. Boats equipped for use both with and without an outboard engine shall be tested in both conditions.

b) For inboard engines, the replacement mass shall be lead, steel or iron of a mass equal to 75 % of the installed mass of the engine and stern-drive.

c) Replacement masses shall, as far as practicable, have the same position of centre of gravity as the actual engine.

7.5 Compartmentation

The buoyancy of the inflatable buoyancy tube shall be contained within a number of separate buoyancy chambers (compartments). The minimum number of compartments is specified in Table 5.

Table 5 — Minimum number of compartments in buoyancy tube

Maximum motor power rating kW	Dimensional factor F(d)	Minimum Number of buoyant compartments (N)
15 to 45	≤ 8	3
	> 8	4
> 45	≤ 8	4
	> 8	5
NOTE The dimensional factor F(d) is determined by $L_H \times B_H$		

The volume of each compartment (V_c), with internal partition bulkheads in the neutral position, shall be within ± 20 % of the mean compartment volume expressed as the total volume of the buoyancy tube (V_T) divided by the number of buoyancy compartments (N).

Ancillary inflatable compartments that are not permanently fixed to the hull (see 3.3) shall not be included in the above calculation.

Compartments in addition to the minimum requirement may be smaller than those required by the above paragraph.

7.6 Nominal pressures (inflatable buoyancy tubes)

The nominal pressures shall be specified for each compartment of the fully inflated boat. These pressures shall be indicated in the owner's manual (see Clause 9) and on the builders plate (see Clause 8).

In order that the user can ascertain that the nominal pressure has been reached, the manufacturer shall provide appropriate equipment or a pressure gauge for this purpose. Alternatively, instructions shall be included in the owner's manual (see Clause 9) which will enable a sufficiently close estimate to be made.

The nominal pressure shall be consistently expressed in Pascal with bars and pounds per square inch as additional optional units.

As an additional safety measure, the nominal pressures should be indicated on each compartment.

7.7 Strength of the inflatable buoyancy tube

7.7.1 Requirement

The inflatable parts shall remain airtight after each of the tests described in 7.7.2.

If the drop test in 8.2 is not conducted, then the tube attachment shall be tested in accordance with 7.4 in ISO 6185-4:2011.

7.7.2 Test method

7.7.2.1 Test temperature

All tests shall be performed at a temperature of 20 °C ± 3 °C, unless specified otherwise.

7.7.2.2 Heat test (all boats types)

Assemble the inflatable parts and inflate to a pressure of 1,2 times the nominal pressure. Place the inflatable parts in a heat chamber, set at 60 °C, for a period of 6 h. On completion of the test period, remove the inflatable parts from the heat chamber and allow to cool down to ambient temperature. Test the airtightness of the inflatable parts in accordance with the test specified in 7.7.2.4.

Alternatively, sample individual inflated pieces of all the different types of the inflatable parts used in the boat may be tested provided they are exactly the same as the production type. For inflatable buoyancy tubes, the minimum length of the sample piece shall be no less than 1m

7.7.2.3 Overpressure test

Inflate each compartment of the buoyancy tube to 1,5 times the nominal pressure for 30 min. When separate compartments have common envelope parts (for example, internal partition bulkheads), these compartments shall be individually tested with adjacent compartments deflated. No damage or rupture shall occur and the boat shall be tested for airtightness as described in 7.7.2.4.

7.7.2.4 Airtightness test

Support or insulate the boat from the floor and do not expose it to any draught of air or direct sunlight. Inflate the boat (all compartments) for 30 min to a pressure of 1,2 times the nominal pressure (see 7.6) in order to pre-stretch the boat. Then reset the pressures to the nominal pressure for a further 30 min period in order to stabilize conditions. Reset the pressures to the nominal pressure and record the ambient temperature and atmospheric pressure. Following a test period of 24 h, the pressure drop shall not be greater than 20 % in any compartment. Record the final ambient temperature and atmospheric pressure.

The temperature difference between the start of the test and the test readings shall not exceed ± 3 °C.

The atmospheric pressure difference between the start of the test and the test readings shall not exceed ± 1 %.

For each rise or fall in ambient temperature of 1 °C, an allowance of 0,004 bar may be respectively subtracted from, or added to, the recorded boat pressure.

7.8 Maximum motor power

The maximum motor power, in kilowatts, for inboard and outboard boats shall be determined by the requirements of ISO 11592.

For waterjet driven boats, the engine maximum power rating determined above may be increased by 35 %.

NOTE Notwithstanding that ISO 11592 excludes certain types of inflatable boats, its methods of determining maximum motor power are entirely applicable to Type VII and Type VIII boats.

7.9 Man overboard prevention and recovery

All boats shall comply with the relevant clauses of ISO 15085, viz: slip resistant areas, foot stops, handholds, body support and handholds, means of reboarding, etc.

Where persons are seated on the buoyancy tubes, 2 handholds per person shall be provided, at least one of which shall be placed inboard of the vertical tangent to the tube, to assist persons against falling overboard.

NOTE Notwithstanding that the current version of ISO 15085 excludes inflatable boats, the requirements of the above mentioned clauses are entirely applicable to Type VII and Type VIII boats.

7.10 Field of vision from the helm position

The field of vision from the main helm position shall conform to the requirements of ISO 11591.

7.11 Provision for (a) liferaft(s)

Type VII boats with L_H greater than 6 m and all Type VIII boats shall have provision for (a) liferaft(s) to be stowed for the crew limit (CL). If the liferaft is a rigid canister type, it shall be mounted in the cockpit, ready for use. If the liferaft is contained in a soft bag then it may be stowed in a compartment but shall be readily available for use.

7.12 Strength of the Rigid Structure (type test only)

The strength of the rigid structure shall meet the requirements of ISO 12215-5 or other relevant structural rules, or performance tests as described in 8.2 and 8.3.

7.13 Strength of principal fitted accessories

7.13.1 General

The strength of principal accessories is paramount to safety and shall be sufficient for its intended use. The purpose of these tests is to simulate loads that can be experienced in normal use and indicate if the accessory itself and its attachment system are of sufficient strength.

7.13.2 Requirement

The attachment systems of accessories such as seats and steering consoles are required to be tested in accordance with either of the tests in 7.13.3 or 7.13.4.

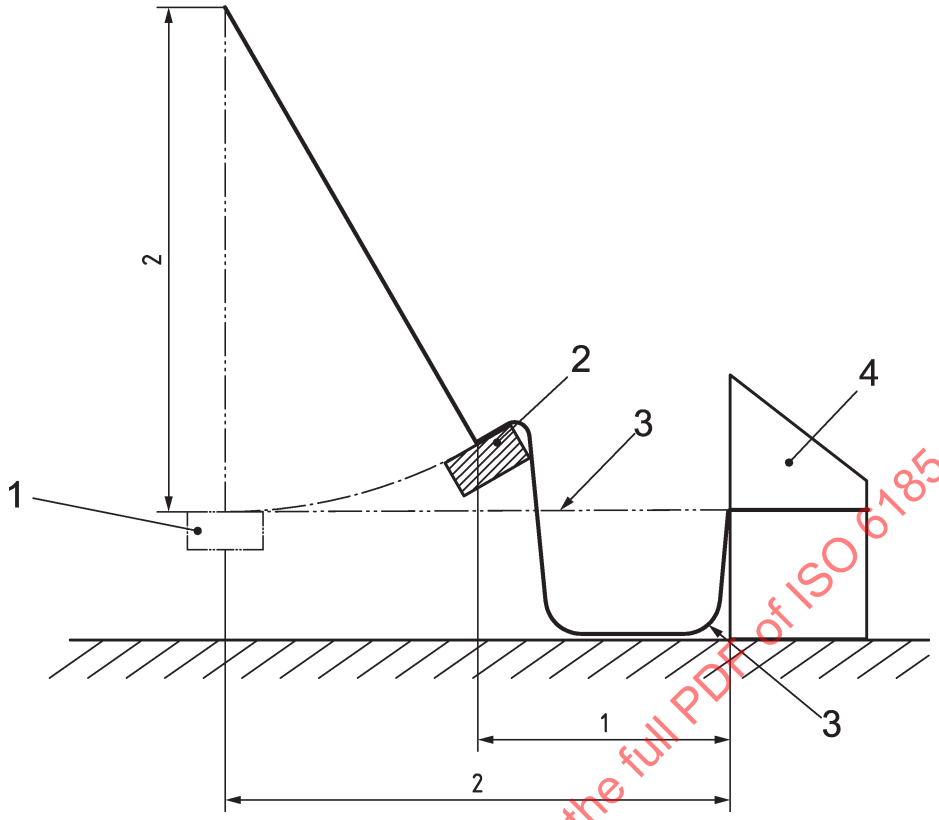
At the end of the test, closely examine the attachment systems and all surrounding surfaces. There shall be no damage evident.

7.13.3 Test method A

Prepare the accessory to be tested by fitting it in the boat or on a sample piece of the cockpit using exactly the same method as the assessed boat.

Suspend a 225 kg test weight vertically by a 2 m wire so that it is positioned at a horizontal distance of at least 2 m away from the test accessory. Attach a 2 m retainer wire from the test weight to the level of the steering wheel of the test accessory. Pull the test weight in the desired direction at least 1 m towards the test accessory then immediately release it, allowing it to swing freely away from the test accessory for at least 1 m before the retainer wire brings it to a stop (see Figure 3). The test shall be carried out for in the fore and aft directions as well as the transversal port and starboard directions

Dimensions in metres



Key

1 test mass
2 test mass pulled within 1m of the test accessory
3 2m retainer wire [free hanging (3a) and under tension (3b)]
4 test accessory (steering console is depicted)

Figure 3 — Testing the strength of factory fitted accessories

7.13.4 Test method B

Any cordage used for test purposes shall have a diameter of 8 mm.

Prepare the accessory to be tested by fitting it in the boat or a sample piece of the cockpit using exactly the same method as the production series.

Gradually load the accessory up to 2000 N in the upward and downward vertical directions, the horizontal fore and aft directions as well as the transversal port and starboard directions, maintaining this load for 60 s each time.

7.14 Safety Sign

Boats assigned design category B shall have safety sign displayed at the helm position in accordance with Figure 4.

Sign W001 "General warning" from ISO 7010	
Supplementary text to read	No crew to sit on tubes when in Design Category B

Figure 4 — Safety Sign

The design of the sign shall comply with ISO 3864-1. Text shall be in black on a white background, using a plain sans serif typeface such as Arial Narrow. The language used shall be acceptable or as required in the country of intended use. Lettering shall not be less than 3 mm high, and the warning symbol not less than 20 mm high.

8 Performance

8.1 General

If the structural integrity has not been demonstrated by compliance with ISO 12215-5 or other relevant structural rules then test the boat to show compliance with 8.2 to 8.6.

If the structural integrity has been demonstrated by compliance with ISO 12215-5 or other relevant structural rules then test the boat to show compliance with: 8.3.1 b) to g) 8.4, 8.5 and 8.6.

Assemble the boat in accordance with the supplied instructions and inflate it to the nominal pressure.

Perform the tests in the order given in 8.2 to 8.7.

Perform tests 8.3, 8.4 and 8.5 in conditions with observed significant wave heights as shown in Table 6.

Table 6 — Sea conditions

Boat type	Dimensional factor $F(d)$	Observed significant wave height mm
Type VII	≤ 8	600
	> 8	900
Type VIII	N/A	1 000
NOTE The dimensional factor is defined in Table 4 of 7.6		

8.2 Drop test (Ribs only)

8.2.1 Requirement

Closely examine the boat at the end of the test.

There shall be no structural failures in the form of fractures, cracks, tears, separation, etc. on any part of the hull or boat component, such as the cockpit or thwarts, and including any boundary interface such as floor/hull, cockpit/transom, buoyancy tube/hull, etc.

8.2.2 Test method

Prepare the boat to the fully loaded condition (m_{LDC}). The distribution of this load shall represent the boat fitted with motor(s) of the maximum power rating and the crew (CL) seated in their normal positions.

Consecutively drop the loaded boat from a height of 2 m (from water to lowest point of boat) into the water using three different boat attitudes:

a) horizontal;

b) bow down 45°;

c) stern down 45°.

8.3 In-water performance

8.3.1 Requirement

The boat shall be equipped with any load-bearing accessories offered as standard or optional equipment.

Test the boat, in the manner described in 8.3.2, fitted with motor(s) of the maximum power rating.

Closely examine the boat at the end of the test period.

There shall be no:

a) structural failures in the form of fractures, cracks, tears, separation, etc. on any part of the hull and floor or and including any boundary interface such as floor/hull, cockpit/transom, buoyancy tube/hull, etc.;

b) structural failures in the form of fractures, cracks, tears, separation, etc. on any boat component, such as the cockpit or thwarts;

c) damage to any accessory or to the method of attachment to the boat;

d) signs of abrasion that could result in subsequent structural damage or failure;

e) tendency of the boat to overturn;

f) evidence of the boat not remaining reasonably dry;

g) hindrance to the coxswain maintaining reasonable visibility at all times.

8.3.2 Test methods

8.3.2.1 General

Use the remote steering system if it is supplied as standard equipment. If it is offered as optional equipment, carry out the test using both tiller and remote steering systems consecutively.

Use the coxswain and crew-member seating systems if they are supplied as standard or optional equipment.

8.3.2.2 Testing — Lightly loaded

Embark a coxswain only. The total period of test shall be not less than 45 min with the motor controls set to develop maximum forward thrust.

Head the boat directly upwind and then successively downwind on courses of approximately 45° separation (see Figure 5). This will give a minimum of at least five separate courses encountering a head-on, bowquarter, beam, sternquarter and following sea condition. Turn the boat sharply towards the end of each course to port and starboard (see Figure 5).

8.3.2.3 Testing — Fully loaded

Repeat the test described in 8.3.2.2 but with the boat uniformly loaded up to the fully loaded capacity (m_{LDC}) condition.

All handholds shall be clearly seen to have satisfied the requirements of 6.2.1.

All seating and attachment systems shall be clearly seen to have satisfied the requirements of 6.10.

8.4 Rowing test (where applicable, see 6.5)

Row the boat for a distance of not less than 300 m in both the lightly loaded condition (see 8.3.2.2) and the fully loaded condition (see 8.3.2.3).

Examine the rowlock system during and on completion of the test, and measure the unrestricted movement of the oars.

8.5 Watertightness test (not applicable to open floor, self-bailing boats)

8.5.1 Requirement

Closely examine the boat at the end of the test.

There shall be no evidence of water within the boat.

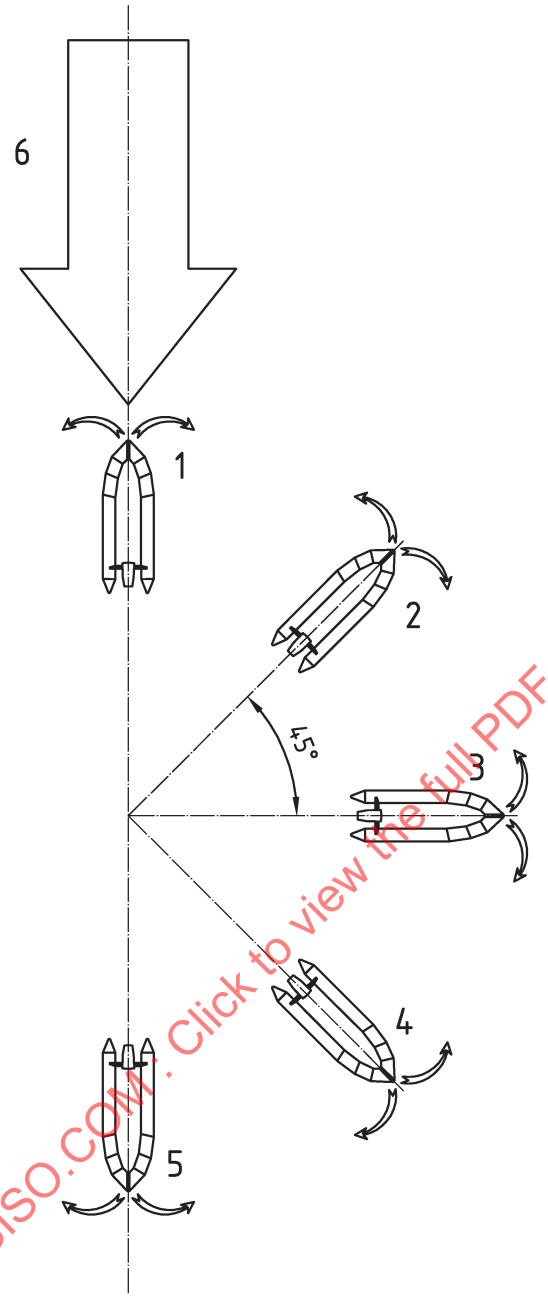
8.5.2 Test method

Ensure that there is no water within the boat. Prepare the boat to the fully loaded condition (m_{LDC}). The distribution of this load shall represent the boat fitted with motor(s) of the maximum power rating and the crew (CL) seated in their normal positions.

Allow the boat to remain static in the water for 20 min.

8.6 Manoeuvring-speed test

Rib's capable of a top speed of 30 kn or more, which are supplied with a remote steering system as standard equipment shall conform to the manoeuvring-test procedure specified in ISO 11592.



Key

1 upwind course
2 bowquarter course
3 beam-wind course
4 sternquarter course
5 downwind course
6 true wind

Figure 5 — In-water performance test