

---

---

**Small craft — Inflatable liferafts —**

**Part 1:  
Type 1 and type 2**

*Petits navires — Radeaux de survie gonflables —*

*Partie 1: Type 1 et type 2*

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

ISO 9650-1:2022

<https://standards.iteh.ai/catalog/standards/sist/71179528-2cef-4936-8439-dcbe60b8b04d/iso-9650-1-2022>



iTeh STANDARD PREVIEW  
(standards.iteh.ai)

[ISO 9650-1:2022](https://standards.iteh.ai/catalog/standards/sist/71179528-2cef-4936-8439-dcbe60b8b04d/iso-9650-1-2022)

<https://standards.iteh.ai/catalog/standards/sist/71179528-2cef-4936-8439-dcbe60b8b04d/iso-9650-1-2022>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2022

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

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

Published in Switzerland

# Contents

	Page
Foreword.....	iv
Introduction.....	vi
<b>1 Scope.....</b>	<b>1</b>
<b>2 Normative references.....</b>	<b>1</b>
<b>3 Terms and definitions.....</b>	<b>1</b>
<b>4 General provisions.....</b>	<b>2</b>
4.1 General.....	2
4.2 Types of liferaft.....	3
<b>5 Requirements.....</b>	<b>3</b>
5.1 General requirements.....	3
5.2 Detailed requirements.....	4
5.2.1 Deployment.....	4
5.2.2 Inflation.....	5
5.2.3 Buoyancy.....	6
5.2.4 Stability and performance at sea.....	7
5.2.5 Solidity, watertightness, materials.....	8
5.2.6 Habitability.....	9
5.2.7 Visibility to rescuers.....	10
5.2.8 Fittings and equipment.....	11
5.2.9 Instructions and marking.....	14
5.2.10 Packaging.....	16
<b>6 Testing.....</b>	<b>16</b>
6.1 General.....	16
6.2 Launching (drop) test.....	17
6.3 Inflation tests under temperature.....	18
6.3.1 General.....	18
6.3.2 Ambient-temperature test.....	18
6.3.3 High-temperature test.....	18
6.3.4 Low-temperature test.....	18
6.4 Testing of stabilization means.....	19
6.5 Righting test.....	19
6.6 Boarding test.....	19
6.7 Towing test with sea anchor deployed.....	19
6.8 Pressure test.....	20
6.8.1 Buoyancy chambers and canopy support.....	20
6.8.2 Inflatable floor (if fitted).....	20
6.9 Canopy watertightness test.....	20
6.10 Visual inspection of the protective outer container.....	21
6.11 Visual inspection of the liferaft.....	21
6.12 Equipment.....	21
6.13 Pressure relief valve test.....	21
6.14 Lights and batteries test.....	21
6.15 Mooring out test.....	21
6.16 Float free buoyancy test.....	21
<b>7 Servicing.....</b>	<b>22</b>
<b>Bibliography.....</b>	<b>23</b>

## 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 second edition of ISO 9650-1 cancels and replaces ISO 9650-1:2005 and ISO 9650-2:2005, which have been technically revised.

The main changes are as follows:

- ISO 9650-1 and ISO 9650-2 have been merged;
- the Scope has been modified to align with meteorological conditions;
- the types and groups of liferafts have been rationalized (see [4.2](#));
- a new float free launching status has been added (see [5.2.1.1.2](#)), with requirements added in [5.2.9](#), and test requirements added in [6.1](#) and [6.16](#);
- a reference standard for gas inflation systems has been added (see [5.2.2.2](#));
- requirements for the initial inflation system have been added (see [5.2.2.2](#));
- the requirements for the canopy have been modified (see [5.2.6.2](#));
- the requirements for boarding systems have been modified (see [5.2.8.2.1](#));
- the reference standard for sea anchors has been updated (see [5.2.8.2.2](#));
- requirements for marking products have been increased (see [5.2.9](#));
- a testing schedule for prototypes, manufacturing and servicing has been added (see [Clause 6](#));
- the testing requirements have been modified (see [Clause 6](#));
- terminology of painter/towing line has been reviewed throughout the document.

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).

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

ISO 9650-1:2022

<https://standards.iteh.ai/catalog/standards/sist/71179528-2cef-4936-8439-dcbe60b8b04d/iso-9650-1-2022>

## Introduction

This document is intended for inflatable liferafts for small craft used for leisure activities. It does not apply to liferafts required for ships under the International Convention for the Safety of Life at Sea (SOLAS), 1974<sup>[3]</sup>. A liferaft manufactured and maintained in accordance with this document should provide:

- a reasonably safe refuge for a shipwrecked person awaiting rescue;
- a reasonable service lifetime, provided the user meets the manufacturer's clearly specified recommendations on stowage and maintenance.

Conformity to this document does not imply that a liferaft will be suitable in all circumstances.

Users are responsible for selecting a liferaft appropriate to the intended circumstances of use. Liferaft manufacturers and vendors should inform potential purchasers of the properties of the product, including possible choices (e.g. different equipment packs), limits on normal usage, and recommendations on stowage and maintenance.

The tests in this document have been designed to simulate reality as closely as possible. Conformity to a test does not guarantee similar performance in service. For example, conformity to the re-righting tests does not guarantee that a liferaft can be righted at sea by an exhausted person in all circumstances.

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

[ISO 9650-1:2022](https://standards.iteh.ai/catalog/standards/sist/71179528-2cef-4936-8439-dcbe60b8b04d/iso-9650-1-2022)

<https://standards.iteh.ai/catalog/standards/sist/71179528-2cef-4936-8439-dcbe60b8b04d/iso-9650-1-2022>

# Small craft — Inflatable liferafts —

## Part 1: Type 1 and type 2

### 1 Scope

This document specifies the minimum requirements for design, performance and marking, and gives the test methods for inflatable liferafts of type 1 and type 2:

- having a carrying capacity of 4 persons to 16 persons;
- intended for small craft of a hull length of up to 24 m;
- intended for launching overboard from a height not exceeding 6 m.

NOTE Type 1 and type 2 liferafts are defined in 4.2.

### 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 12402 (all parts), *Personal flotation devices*

ISO 15738:2019, *Ships and marine technology — Maritime safety — Gas inflation systems for inflatable life-saving appliances*

ISO 17339, *Ships and marine technology — Life saving and fire protection — Sea anchors for survival craft and rescue boats*

International Maritime Organization (IMO) SOLAS 83, Chapter III, Resolution A.658(16), Annex 2

IMO. SOLAS International Life-Saving Appliance (LSA) Code

### 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

##### operating pressure

pressure determined by the designed reseal pressure of the relief valves, except that, if the actual reseal pressure of the relief valves, determined by testing, exceeds the designed reseal pressure by more than 15 %, the higher figure is used

### 3.2

#### **full load**

load of the number of persons corresponding to the *carrying capacity* (3.7) of the liferaft, each weighing 82,5 kg, seated at their normal place, or, unless otherwise specified, load of the number of uniformly distributed equivalent masses weighing 82,5 kg (e.g. bags of sand) and all required equipment

Note 1 to entry: See 5.2.3.2 and 5.2.3.3 for the carrying capacity.

### 3.3

#### **buoyancy chamber**

buoyancy compartment

*inflatable compartment* (3.5) contributing to the buoyancy of the liferaft

### 3.4

#### **small craft**

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

[SOURCE: ISO 8666:2020, 3.15, modified — “small craft” has replaced “craft” as the preferred term.]

### 3.5

#### **inflatable compartment**

compartment that inflates to provide insulation, buoyancy or structure

### 3.6

#### **calm water**

water conditions at or below meteorological condition Beaufort force 3

### 3.7

#### **carrying capacity**

number of persons that a liferaft is permitted to accommodate

## 4 General provisions

### 4.1 General

4.1.1 An inflatable liferaft is comprised of:

- a structure;
- an inflation system;
- fittings;
- equipment;
- instructions;
- a protective outer container.

4.1.2 The structure of a liferaft is comprised of:

- at least two independent buoyancy chambers;
- a floor;
- a canopy and a canopy support;
- stabilization means.



**4.1.3** The inflation system is comprised of:

- an initial inflation system;
- a manual back-up inflation system.

**4.1.4** The fittings shall include:

- external lighting;
- a painter/mooring line;
- a painter/towing attachment point;
- external and internal lifelines;
- a righting system;
- means of boarding;
- a sea anchor;
- a rescue quoit and line;
- a safety knife.

Further fittings may be included, provided the tests of [Clause 6](#) are completed.

## 4.2 Types of liferaft (standards.iteh.ai)

This document defines two types of liferaft:

- type 1: ISO 9650-1:2022  
<https://standards.iteh.ai/catalog/standards/sist/71179528-2cef-4936-8439-dcbe60b8b04d/iso-9650-1-2022>
  - designed for extended voyages, where high wind and significant wave heights can be experienced, but excluding abnormal conditions such as hurricanes;
  - prepared to meet serious emergencies without expectation of outside assistance;
  - not for voyaging in extreme zones;
- type 2:
  - designed for conditions up to significant wave height of 2 m, and up to and including a wind speed of Beaufort force 6;
  - designed for conditions with an ambient air temperature of above 10 °C.

## 5 Requirements

### 5.1 General requirements

Inflatable liferafts serviced in accordance with the manufacturer's instructions shall satisfy the requirements described in this document.

[Table 1](#) summarizes the subclause(s) to consider for each main characteristic.

**Table 1 — General requirements**

Characteristics	Requirements in	Tests methods in
Launching	<a href="#">5.2.1.1</a>	<a href="#">6.2</a> , <a href="#">6.16</a>
Inflation	<a href="#">5.2.2</a>	<a href="#">6.3</a>
Buoyancy	<a href="#">5.2.3</a>	<a href="#">6.15</a>
Stability and performance at sea	<a href="#">5.2.4</a>	<a href="#">6.4</a> , <a href="#">6.5</a> , <a href="#">6.6</a> , <a href="#">6.7</a> , <a href="#">6.15</a>
Solidity, watertightness, materials	<a href="#">5.2.5</a>	<a href="#">6.8</a> , <a href="#">6.9</a> , <a href="#">6.15</a>
Habitability	<a href="#">5.2.6</a>	—
Visibility to rescuers	<a href="#">5.2.7</a>	<a href="#">6.14</a>
Fittings and equipment	<a href="#">5.2.8</a>	<a href="#">6.12</a> , <a href="#">6.13</a> , <a href="#">6.14</a>
Instructions and marking	<a href="#">5.2.9</a>	<a href="#">6.10</a>
Packaging	<a href="#">5.2.10</a>	<a href="#">6.10</a>

## 5.2 Detailed requirements

### 5.2.1 Deployment

#### 5.2.1.1 Launching

##### 5.2.1.1.1 Manual launching

The liferaft shall be capable of being dropped into the water from a minimum height of 6 m above the water level or the liferaft storage position, whichever is the greater, without damage, in accordance with [6.2](#).

##### 5.2.1.1.2 Float free launching

In addition to the manual launching capability, if the liferaft is designed to also be suitable for float free stowage and release:

- it shall be labelled “float free release”;
- the liferaft as stowed shall have a buoyancy of twice the actuation force necessary to activate the inflation system (see [5.2.2](#));
- the liferaft shall be tested in accordance with [6.16](#).

##### 5.2.1.2 Properties of the painter

The painter/towing attachment point shall be accessible from the entrance to the liferaft.

The length of the painter shall be at least 9 m and no longer than 15 m.

A contrasting coloured indication shall be visible at 1 m from the firing point  $\pm 0,1$  m. The painter shall be easy to handle and to pull.

The painter breaking load shall not be less than:

- 7,5 kN for capacities of 4 to 12 persons;
- 10 kN for capacities of 13 to 16 persons.

The breaking load of the painter’s attachment/towing system to the liferaft shall be greater than the painter by at least 0,5 kN.

The painter attachment/towing system shall be constructed so as to not damage the liferaft on failure of the attachment system during the liferafts' serviceable life.

The painter shall withstand weathering, so as not to detrimentally effect its intended use for the service interval of the liferaft.

## 5.2.2 Inflation

### 5.2.2.1 General

Type 1 liferafts shall be designed to inflate correctly in an air temperature between  $-15\text{ }^{\circ}\text{C}$  and  $+65\text{ }^{\circ}\text{C}$  during the course of the launching and temperature inflation tests conducted in accordance with [6.2](#) and [6.3](#).

Type 2 liferafts shall be designed to inflate correctly in an air temperature between  $0\text{ }^{\circ}\text{C}$  and  $+65\text{ }^{\circ}\text{C}$  during the course of the launching and temperature inflation tests conducted in accordance with [6.2](#) and [6.3](#).

### 5.2.2.2 Initial inflation system

The initial inflation system shall be actuated by a pull on the painter, thereby allowing the release of pressurized gas. All subsequent force exerted on the painter shall act directly on the painter/towing attachment point, or any other point offering strength characteristics equivalent to the values required for the painter (see [5.2.1.2](#)).

This inflation system may be supplemented by an automatic inflation system, i.e. inflation without pulling on the painter (e.g. hydrostatic pressure-sensitive automatic actuation).

The inflation system including valves shall meet the requirements of ISO 15738:2019 with the following changes:

- a) The temperature  $-30\text{ }^{\circ}\text{C}$  in ISO 15738:2019, 6.2.2.3, 6.2.2.4, 6.2.2.6, 6.3.1, 6.3.2.2 and 6.3.2.5, may be substituted with  $-15\text{ }^{\circ}\text{C}$ .
- b) The cold inflation test in ISO 15738:2019, 6.2.2.4, may be replaced with a test performed on a complete gas inflation system. The gas cylinder's capacity and the charge to be considered shall be the most demanding as designed by the manufacturer. In such condition, the complete and continuous discharge of the gas does not need to be achieved within the 20 s time cap. However, there shall be no interruptions of flow by ice formation.
- c) The long-term leak test in ISO 15738:2019, 6.2.2.6, carried out after the test in ISO 15738:2019, 6.2.2.3, may be replaced with a shorter term test in which the leak rate can be demonstrated to be less than 2 % over 18 months.
- d) The impact test in ISO 15738:2019, 6.2.2.7, may be performed with a gas inflation valve fitted with its dedicated mean of protection as defined in ISO 15738:2019, 6.2.1.2, if this is normally fitted during production.
- e) The height 2 m in the test in ISO 15738:2019, 6.3.2.5, may be substituted with 1 500 mm and the test may be carried out at ambient temperature.
- f) For the ingress test in ISO 15738:2019, 6.3.2.6, if the head is always used on a raft packed in watertight containment, this test can be carried out with the head installed in a watertight containment to replicate its normal installation
- g) ISO 15738:2019, Clauses 9 and 10, do not apply.

### 5.2.2.3 Quantity of gas

The quantity of gas shall be sufficient for the liferaft to inflate and achieve working pressure under low temperatures, as required by [6.3.4](#).

The quantity of gas in the cylinder shall be such that the internal pressure of the cylinder, at the temperature of +65 °C, does not exceed the hydraulic test pressure of the cylinder.

### 5.2.2.4 Relief valves

The number and location of relief valves shall be such that the pressure is limited in all the inflatable compartments.

Relief valves shall be able to be sealed off according to the manufacturer's instructions. The relevant outlet should not discharge inside the liferaft.

The relief valves shall be positioned so that they can be sealed off from the interior of the raft, the canopy opening or the lookout position, in such a way that this can be achieved without leaving the interior of the raft.

### 5.2.2.5 Non-return valves

Sufficient non-return valves shall be provided at gas inlets to conform to [5.2.3.1](#).

### 5.2.2.6 Topping-up inflation valves

All inflatable compartments, including canopy supports, but excluding, where fitted, boarding ramps, shall be provided with a topping-up non-return valve allowing the compartments to be inflated by a bellows or a pump.

## 5.2.3 Buoyancy

### 5.2.3.1 Number of compartments

Buoyancy shall be provided by not less than two separate compartments, each inflated through a non-return inflation valve on each compartment.

The buoyancy chamber shall be so arranged that, in the event of any one of the compartments being damaged or failing to inflate, the intact compartments shall be able to support, with positive freeboard over the liferaft's entire periphery, the number of persons which the liferaft is permitted to accommodate, each having a mass of 82,5 kg and seated in their normal positions.

### 5.2.3.2 Carrying capacity — Type 1 liferaft

The number of persons that a liferaft shall be permitted to accommodate shall be equal to the lesser of:

- a) the greatest whole number obtained by dividing by 0,096 the volume, measured in cubic metres, of the main buoyancy tubes (which for this purpose shall not include the arches or the thwarts, if fitted) when inflated; or
- b) the greatest whole number obtained by dividing by 0,372 the inner horizontal cross-sectional area of the liferaft, in square metres, measured to the innermost edge of the buoyancy tubes; or
- c) the number of persons having an average mass of 82,5 kg, each wearing a personal flotation device (PFD) meeting the requirements of the ISO 12402 series with a minimum buoyancy of 150 N, that can be seated with sufficient comfort and headroom.

If the PFD in c) is inflatable, it shall be inflated during the test.