
**Ships and marine technology —
Inflatable buoyancy support systems
against flooding of ships —**

**Part 2:
Buoyancy chamber**

**iTeh STANDARD PREVIEW
(standards.iteh.ai)**

[ISO 23121-2:2019](https://standards.iteh.ai/catalog/standards/sist/23f76440-a5ab-481f-9fd7-2300be0d8011/iso-23121-2-2019)

<https://standards.iteh.ai/catalog/standards/sist/23f76440-a5ab-481f-9fd7-2300be0d8011/iso-23121-2-2019>



iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 23121-2:2019

<https://standards.iteh.ai/catalog/standards/sist/23f76440-a5ab-481f-9fd7-2300be0d8011/iso-23121-2-2019>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2019

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
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 General requirements	2
4.1 General.....	2
4.2 Valves.....	2
4.2.1 Topping-up inflation valve.....	2
4.2.2 Non-return valve.....	2
4.2.3 Relief valve.....	2
4.3 Indicator.....	2
4.4 High pressure hose assembly (if fitted).....	2
5 Materials	3
5.1 Metallic parts.....	3
5.2 Fabrics.....	3
5.3 Test methods.....	4
5.3.1 General conditions.....	4
5.3.2 Test specimens.....	4
5.3.3 Tensile strength.....	4
5.3.4 Tear test (constant rate of traverse method).....	4
5.3.5 Coating adhesion, ply separation and surface receptiveness test.....	4
5.3.6 Low temperature bend test.....	4
5.3.7 Porosity test.....	4
5.3.8 Ageing test.....	5
5.3.9 Hydrolysis test.....	5
5.3.10 Resistance to blocking test.....	5
5.3.11 Oil resistance test.....	5
5.3.12 Seam strength test.....	5
6 Inflation tests	5
6.1 General.....	5
6.2 Ambient temperature test.....	5
6.3 High temperature test.....	6
6.4 Low temperature test.....	6
6.5 Pressure test.....	6
6.5.1 Test for air pressure conservation.....	6
6.5.2 Excess pressure test.....	6
Bibliography	8

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 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.

This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 8, *Ship design*.

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.

Introduction

This document is intended to support the development and technical implementation of various types of buoyancy support systems.

In case of marine accidents, such as collisions and groundings, excessive damage and flooding can cause the ship to sink, capsize or impede the use of its essential navigation equipment. As a ship has watertight bulkheads, doors, hatches and other equipment, the consequences of flooding accidents can usually be mitigated at the early phases of the accident. Subsequently, the progressive flooding after an important accident can cause the sinking or capsizing of the ship.

To counter these problems, inflatable buoyancy support systems can be used, which are composed of a gas supply system and a buoyancy chamber, where the gas supply system provides the medium for the inflation of the buoyancy chamber. A fixed fire extinguisher can be used as a gas inlet when the ship is at risk of sinking or overturning. When fire extinguishers are used to supply the media into the buoyancy chamber, additional means must be available not to impair fire-fighting, following SOLAS, Chapter II-2A, Regulation 4. Buoyancy chambers have various shapes and capacities to aid a damaged ship's buoyancy.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 23121-2:2019](#)

<https://standards.iteh.ai/catalog/standards/sist/23f76440-a5ab-481f-9fd7-2300be0d8011/iso-23121-2-2019>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 23121-2:2019

<https://standards.iteh.ai/catalog/standards/sist/23f76440-a5ab-481f-9fd7-2300be0d8011/iso-23121-2-2019>

Ships and marine technology — Inflatable buoyancy support systems against flooding of ships —

Part 2: Buoyancy chamber

1 Scope

This document specifies general requirements, the materials and test methods for the buoyancy chamber of inflatable buoyancy support systems, which serve residual buoyancy for damaged ships not to sink or capsize, and which can be installed in machinery spaces and/or cargo holds.

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 1402, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing*

ISO 1419:2019, *Rubber- or plastics-coated fabrics — Accelerated-ageing tests*

ISO 1421:2016, *Rubber- or plastics-coated fabrics — Determination of tensile strength and elongation at break*

ISO 2231:1989, *Rubber- or plastics-coated fabrics — Standard atmospheres for conditioning and testing*

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

ISO 4674-1:2016, *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 5978, *Rubber- or plastics-coated fabrics — Determination of blocking resistance*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

ISO 9650-3, *Small craft — Inflatable liferafts — Part 3: Materials*

IMO Resolution MSC 81(70):1998, *Revised recommendation on testing of life-saving appliances*

3 Terms and definitions

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

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

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

3.1 inflatable buoyancy support system

system composed of a gas supply system and an inflatable *buoyancy chamber* (3.3) against flooding of ships

3.2 operating pressure

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

3.3 buoyancy chamber

chamber contributing to the buoyancy of a damaged ship

4 General requirements

4.1 General

The buoyancy chamber shall inflate within an air temperature range between -15 °C and 65 °C.

A schematic diagram of the inflatable buoyancy support system is shown in Figure 1 of ISO 23121-1:2019.

4.2 Valves

iTeh STANDARD PREVIEW

4.2.1 Topping-up inflation valve (standards.iteh.ai)

All inflatable compartments shall be provided with a topping-up non-return valve allowing the compartments to be inflated by a bellows or a pump.

ISO 23121-2:2019
<https://standards.iteh.ai/catalog/standards/sist/23f76440-a5ab-481f-9fd7-2300be0d8011/iso-23121-2-2019>

4.2.2 Non-return valve

Sufficient non-return valves shall be provided to the gas supply system.

4.2.3 Relief valve

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

The relief valves shall be able to be sealed off temporarily according to the manufacturer's instructions. The relevant outlet shall not discharge inside the buoyancy chamber.

If the gas medium is carbon dioxide, the released medium shall be ventilated before entering the buoyancy chamber.

4.3 Indicator

Pressure and temperature indicators shall be provided to monitor the inflation of the buoyancy chamber.

4.4 High pressure hose assembly (if fitted)

Where a high-pressure hose assembly, if fitted, is used to convey the gas from the cylinder to the buoyancy chamber, it shall meet the following requirements (see also ISO 9650-1):

- a) it shall show no leaks or any sign of deterioration after having been subjected, during at least 1 min, to a hydraulic test in accordance with ISO 1402, under a pressure of 12,5 MPa for liquefied gases and of 20 MPa for non-liquefied gases;

- b) it shall operate within a temperature range of:
- 1) between -45 °C and $+65\text{ °C}$ inclusive, for liquefied gases;
 - 2) between -20 °C and $+65\text{ °C}$ inclusive, for non-liquefied gases;
- c) at the lowest temperature of each of the ranges defined in b) above, the hose shall be bent through 180° over a mandrel of radius 5 cm and shall meet the requirements of a);
- d) the hose assembly shall not be in contact with any sharp edges and shall not show any sign of corrosion when tested;
- e) the bursting pressure of the hose assembly shall not be less than 168 % of the hydraulic test pressure.

NOTE A new hose can be used for each operating test.

5 Materials

5.1 Metallic parts

All exposed metallic parts shall be tested in accordance with ISO 9227 for two periods of 24 h with a 2 h drying period in between (i.e. a total test time of 50 h).

After this test, there shall be no corrosion that might impair the function of the component.

5.2 Fabrics

The materials shall comply with the requirements specified in [Table 1](#).

<https://standards.iteh.ai/catalog/standards/sist/23f76440-a5ab-481f-9fd7-2300be0d8011/iso-23121-2-2019>
Table 1 – Performance requirements

Property	Performance requirements for buoyancy chambers	Subclause number
Tensile strength	not less than 1 500 N/50 mm warp, 1 300 N/50 mm weft	5.3.3
Tear strength, constant rate of traverse method A	not less than 80 N for both warp and weft	5.3.4
Coating adhesion, ply separation and surface receptiveness test	not less than 15 N/10 mm	5.3.5
Low-temperature bend test	Buoyancy chamber material ^a cracking when tested at -50 °C is permissible only if an internal insulation and protection system are used. No cracking or other visible deterioration when tested at -30 °C is allowed.	5.3.6
Porosity	no bubbles visible within 5 min of the start of the test ^a	5.3.7
Ageing test	no cracking, blistering or stickiness	5.3.8
Hydrolysis test	after 14 days at 70 °C , 95 % relative humidity, following ISO 1419:2019, method C: 1) coating adhesion test: not less than 10 N/10 mm ²) folding test: no cracks	5.3.9
Resistance to blocking test	rating between one and two	5.3.10
Oil resistance test	2 h at 20 °C no tackiness test with ASTM no.1 oil	5.3.11
^a For buoyancy chambers using an internal bladder construction, these tests (low-temperature bend test and porosity test) are applicable only to the inner bladder material. The outer support material shall meet a -15 °C low-temperature bend test.		
^b For buoyancy chambers using internal bladders, the specified value is 1 000 N/50 mm.		