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

**Part 1:  
Gas supply system**

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 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](http://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 IMO SOLAS, Chapter II-2A, Regulation 4. Buoyancy chambers have various shapes and capacities to aid a damaged ship's buoyancy.

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

## Part 1: Gas supply system

### 1 Scope

This document specifies general requirements, the installation and the activation of the gas supply system 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.

It is intended to ensure the functions of the gas supply system, which uses a gas media, such as an asphyxiant, to inflate the buoyancy chamber of the inflatable buoyancy support systems.

### 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 7010, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

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

IMO SOLAS, Chapter II-2A, Regulation 4, Fixed fire extinguishing systems

### 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* (3.4) and an inflatable buoyancy chamber against the flooding of ships

#### 3.2

##### **asphyxiant**

medium that can dilute or displace the oxygen in air, leading to asphyxiation if inhaled

#### 3.3

##### **toxic**

medium that can be poisonous or harmful if inhaled

#### 3.4

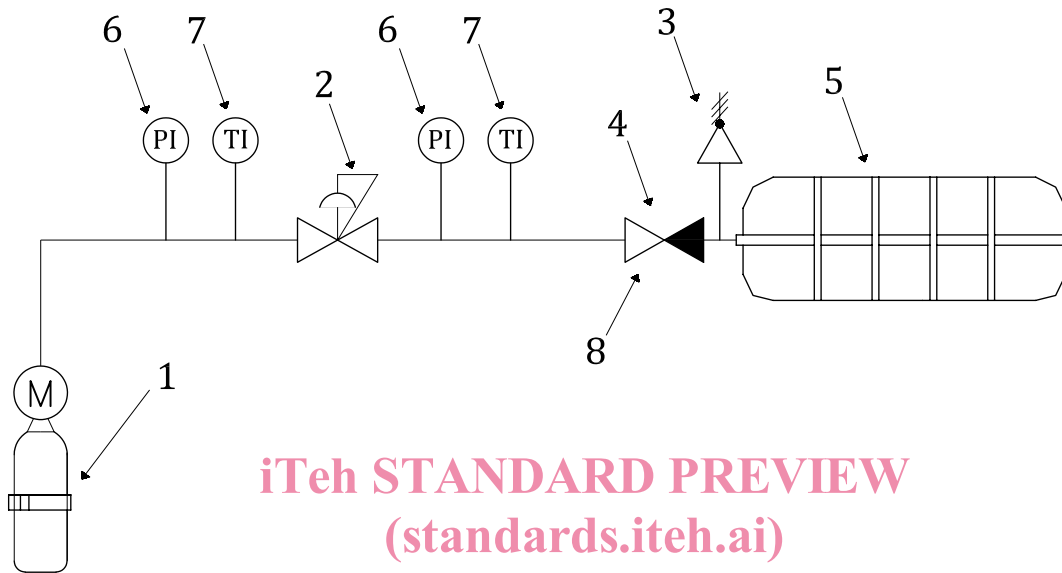
##### **gas supply system**

system for buoyancy chambers inflation, including pipes, valves, nozzles and other components

## 4 General requirements

### 4.1 General

When a fixed fire extinguishing system is used as a gas supply system of an inflatable buoyancy support system, the gas supply system, including its capacity, shall meet the requirements of IMO SOLAS, Chapter II-2A, Regulation 4. Other compartments used for the gas supply system shall be tested in accordance with ISO 15738. [Figure 1](#) shows a schematic diagram of the inflatable buoyancy support system<sup>[1]</sup>.



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**Key**

- 1 gas supply cylinders <https://standards.iteh.ai/catalog/standards/sist/62e45b22-cf30-4504-8b46-b78a39dc4005/iso-23121-1-2019>
- 2 pressure regulators
- 3 relief valves
- 4 non-return valves/topping-up inflation valves
- 5 buoyancy chambers
- 6 pressure indicators
- 7 temperature indicators
- 8 high-pressure hose assemblies

**Figure 1 — Schematic diagram of the inflatable buoyancy support system**

### 4.2 Media

Inlet media that could result in toxic concentrations in the space where they are discharged shall not be used.

Inlet media containing Halon 1211, 1301 and 2402, and per-fluorocarbons shall not be used.

When the gas supply system for the inflatable buoyancy chamber uses a gas medium at or above a harmful concentration to health, the system shall be fitted with a shut-off valve, that clearly indicates open and closed, located as close as possible to the gas cylinders, and distinct from the activation system.

The quantity of media shall be sufficient for the buoyancy chamber of the inflatable buoyancy support system to inflate and achieve the working pressure under temperatures between -15 °C and 65 °C.

The quantity of media 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.



When gas media are used as the medium, the required number of cylinders containing the gas media should be determined according to the required buoyant force and buoyancy chamber volume<sup>[2]</sup>.

### 4.3 Separation from habitable spaces

The gas supply system shall be constructed not to flow and leak the medium into those spaces where it is installed and habitable spaces.

## 5 Installation

### 5.1 General

The inflatable buoyancy chamber shall not be automatically activated.

### 5.2 Fastening

The components for the gas supply system shall be securely fastened to the ship's structure to withstand motions, shocks and vibrations from normal ship operating conditions.

### 5.3 Pressure regulator

If fitted, pressure regulators shall comply with ISO 15738 to prevent damage of sudden inflation of the buoyancy chamber.

### 5.4 Location of the gas cylinders

Cylinders may be installed in an open space outside the buoyancy chamber installed. Cylinders containing the gas media shall be limited to spaces in the ship that are not intended for habitable purposes and are separated from habitable spaces. To minimize corrosion, cylinders shall be mounted clear of the anticipated bilge water level and above surfaces on which water can accumulate.

## 6 Activation

### 6.1 General

For a remote control valve to use the gas supply system, an indicator shall be installed and shall be clearly perceptible from the main helm position (i.e. bridge, machinery control room).

The gas supply system for the inflatable buoyancy chamber shall be operable between  $-15\text{ }^{\circ}\text{C}$  and  $65\text{ }^{\circ}\text{C}$ .

### 6.2 Engine shutdown

In buoyancy support systems using a gas supply system for inflation of the buoyancy chamber to protect a space containing an engine, there shall be a manual or automatic device that shuts down the engine before or during the gas supply.

### 6.3 Displayed information

The information shall be displayed in the appropriate language and places (for example machinery room and/or cargo holds). The information may be represented by symbols in accordance with ISO 7010 or other relevant standards.

NOTE For the general warning sign, see ISO 7010.