
**Manned submersibles — Breathing air
supply and CO₂ adsorption systems
— Performance requirements and
recommendations**

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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 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 13, *Marine technology*.

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.

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Manned submersibles — Breathing air supply and CO₂ adsorption systems — Performance requirements and recommendations

1 Scope

This document specifies performance requirements and gives recommendations for the design of breathing air supply and CO₂ absorption systems of manned submersibles, capable of maintaining suitable life support conditions in the manned compartments.

It is applicable to manned submersibles where the internal pressure of the manned compartment is normally maintained at or near to one atmosphere.

It is not applicable to submersibles where the occupants endure pressures higher than one atmosphere (such as in diving bells, for example).

It is not applicable to submersibles designed to carry passengers or divers in a separate compartment capable of being pressurised to higher than one atmosphere inside the pressure hull (such as in submarine rescue compartments, for example).

2 Normative references

There are no normative references in this document.

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

diving bell

manned non-self-propelled submersible tethered unit consisting of at least one chamber internally pressurized in order to allow a diver to be transported to and from an underwater site

3.2

manned submersible

craft capable of carrying personnel and/or *passengers* (3.6) while operating underwater, submerging, surfacing and remaining afloat with the internal pressure of the *manned compartment* (3.4) normally maintained at or near to one atmosphere

3.3

pressure hull

hull of a submersible that maintains structural integrity while under differential pressure

3.4

manned compartment

compartment of the *pressure hull* (3.3) in which people are carried, generally maintained at a pressure of one atmosphere

- 3.5 passenger submersible**
submersible carrying *passengers* (3.6) that primarily operates underwater and relies on surface support, such as a surface ship or shore-based facilities, for monitoring and for one or more of the following: recharging power supply, recharging high pressure air and recharging life-support
- 3.6 passenger**
person other than the pilot and the members of the crew or other persons employed in any capacity on board a *passenger submersible* (3.5) craft on the business of the craft
- 3.7 breathing air supply system**
equipment providing breathing air to the *manned compartment(s)* (3.4) while the submersible is surfaced or submerged
- 3.8 reserve breathing air supply system**
breathing air supply equipment specifically designated as the 'reserve' component, that is not normally used during planned dives unless some unforeseen emergency circumstance occurs
- 3.9 emergency breathing air supply system**
equipment providing an independent emergency air supply for use in case of fire, smoke or other toxic contaminants in manned compartment(s) or failure of the normal and the *reserve breathing air supply system* (3.8)
- 3.10 CO₂ absorption system**
equipment providing CO₂ absorption while the submersible is surfaced or submerged
- 3.11 LiOH**
lithium hydroxide
highly alkaline inorganic compound that can absorb CO₂ in the air

4 General requirements and recommendations

- 4.1** The breathing air supply system shall be designed with redundancies to avoid loss of breathing air supply due to a single failure in the system.
- 4.2** The CO₂ absorption system shall be designed with redundancies to avoid loss of CO₂ removal capability due to a single failure in the system.
- 4.3** The breathing air supply and CO₂ absorption systems should be designed so that as far as reasonably practicable, incorrect operation of the equipment by trained personnel is not possible.
- 4.4** The breathing air supply and CO₂ absorption systems shall be fit for purpose to operate safely in the specified operating parameters of the submersible. This shall be as a result of a design specification configured to the required safe operating envelope.
- 4.5** The electronic equipment and systems associated with breathing air supply and CO₂ absorption systems shall be able to adapt to the electromagnetic environment of the submersible. Anti-electromagnetic interference measures can be considered if necessary, for example, resisting interference from the VHF.