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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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UK Vote

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Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 21321

Manned submersibles-Manoeuvring test

ICS: 47.080

ISO/TC 8/SC 13

Secretariat: **SAC**

Voting begins on:
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Voting terminates on:
2025-06-23

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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/TC8, *Ships and marine technology*, Subcommittee SC13, *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.

Introduction

As global marine technology continues to develop, manned submersibles are being utilised in an increasing number of fields. A standardized manoeuvring test for manned submersibles may be employed to provide a common approach to the analysis and assessment of the manoeuvrability performance of new build submersibles. The output of such a common approach can provide useful information for the design, development and selection of navigation, power management and other ancillary systems used in the subsequent completion of the submersible's manufacture. To meet the operating safety requirement, it is essential that the manoeuvring test is conducted within the designed safe operating envelope of the submersible including environmental, depth and endurance parameters. The measurement of manoeuvring performance must be accurate and verifiable against a properly considered set of performance expectations. However, currently there is no globally accepted guidance for this element of submersible design and development in the industry. Therefore, this standard's aim is to provide such guidance for the use of the submersible manufacturing and operating community.

Manned submersibles-Manoeuvring test

1 Scope

This document defines general requirement, test item and test method of manoeuvring test on manned submersibles.

It is applicable to manoeuvring test for all manned submersibles at pool, lake and sea.

It is a reference for manoeuvring test on other types of submersibles at pool, lake and sea.

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.

3 Terms and definitions

In this document, whenever a published source serves as the primary basis for a definition, this source is indicated by an abbreviated code. The complete citations for these codes are provided in the Bibliography.

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 <https://www.electropedia.org/>

3.1

manned submersible

submersible that encloses one or more persons within its pressure hull, fitted available surface access, or underwater pressurized or non-pressurized access

3.2

unpowered surfacing

free rising movement of a manned submersible which occurs without the use of propulsion or operation of the submersibles ballast system

3.3

unpowered submerging

free sinking movement of a manned submersible which occurs without the use of propulsion or operation of the submersibles ballast system

3.4

auto-depth keeping

computer-controlled mode to maintain the designated depth relative to the surface

3.5

auto-heading control

computer-controlled mode to maintain the designated heading relative to the seabed

3.6

auto-height keeping

computer-controlled mode to maintain the designated height above the surface

3.7**stopping distance**

a manned submersible travels at a initial speed, the distance from slow down to stop with the use of propulsion

4 General requirement**4.1 Support vessel**

For all submersible trials activities undertaken in open water such as at sea or in an inland lake, a trials support surface vessel should be available to support all the requirements necessary to facilitate the safe conduct of the trials programme. If required the support vessel should be capable of the safe launch and recovery of the submersible in the safe operating envelope of the submersible system. This may include the requirement to be capable of dynamic positioning or mooring to enable the safe launch and recovery to be conducted in the environmental conditions in which the trials will take place. The vessel should be capable of dealing with any foreseeable emergency likely to be encountered during the trials programme. The vessel should also have a robust communication capability such that the submersible's crew are able to communicate with the support vessel at all times during the trials and testing activities.

4.2 Test instruments

- a) These include but are not limited to:
 - i. doppler velocity log
 - ii. depth gauge
 - iii. altimeter
 - iv. motion sensor
 - v. conductivity, temperature and depth sensor(CTD)
 - vi. positioning system.
- b) Depending on the applicable national statutory domain they may need to be approved by national authorities for use in the testing process.
- c) Should be in date for calibration for use in the testing regime and as required by the testing protocol.
- d) Should be installed in a suitable location to achieve the objective of the test process and not adversely affected by movement, moisture, vibration or external environmental conditions during the test.

4.3 Test conditions

- a) The test shall be conducted in a designated sea or inland waterway area where the water depth should be less than design maximum safe operating depth of the manned submersible. The specified test depth should not be affected by surface waves and appropriate safety precautions shall be implemented. This should include a suitably considered plan for recovery of a disabled submersible from the seabed or bottom of the inland waterway.
- b) The temperature, salinity, depth, seafloor topography and current of the seawater in the test area should be measured in advance, as a reference for whether a submersible can dive.
- c) The manned submersible shall remain in good condition. Any faults affecting manoeuvring test shall be removed.

4.4 Emergency Operating Procedures

- a) Emergency operating procedures should be established.