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Ships and marine technology — Requirements and guidance for training, qualification and competency of submersible system crew and other key personnel

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Introduction

The growing number of crewed submersible systems (CSS) in use around the world are operated by personnel filling the key roles of piloting, atmosphere control, power management, passenger safety, submersible system maintenance, operational management and other essential positions. These CSS vary in complexity, capability and function; however, the common attribute is that they are all relatively small and designed to be operated independently underwater by a single member or small numbers of crew. Given the wide variety of design, task and operating circumstances of such crafts, the specific qualifications and skill training requirements for each submersible will reflect its specific needs. However, the fundamental principles of these qualification and training requirements are likely to be common and it is the aim of this document to describe these to provide guidance to submersible operators.

There is some industry guidance available from recognized bodies concerning the operation of CSS, however there is no industry standard for competency levels that are comparable to other marine sector professionals such as dynamic positioning operators. Therefore, there is a need to provide an operating safety benchmark for personnel designated as crew members, maintenance engineers or CSS operational management, all of whom are required to be adequately trained and qualified to be competent to operate such systems and to respond to all reasonably foreseeable emergencies. For each system, specific training should be configured to the submersible's operational requirements. This will usually be done in-house by the CSS operators. However, there are fundamental theoretical and practical competency requirements for personnel engaged or planning to engage in this professional area, which can be reasonably acquired through training methodologies in specialist marine educational facilities or industry sponsored training programmes. These programmes should cover the minimum required skill levels, which must be considered in submersible operator training solutions.

The aim of this document is to provide guidance and requirements on common competence requirements and qualifications for crewed submersible operations to enable operators to develop their own competence schemes, thereby enabling an industry-wide commonality.

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The objectives of this document are to:

a) provide confidence that all personnel appointed to safety-critical and other key positions can carry out their jobs in an effective manner;

b) develop a standard that can be used and recognized across the industry to create a competent workforce;

c) outline a baseline competence framework;

d) reduce operating risk and improve safety;

e) support an effective assessment procedure;

f) specify minimum criteria for qualifications;

g) recommend minimum levels of experience required for achievement of competence;

h) develop industry accepted procedures, criteria and recording systems for competence management.

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1 Scope

This document provides requirements and guidance on common competence requirements and qualifications for crewed submersible operations to enable operators to develop their own competence schemes. It is applicable to any crewed submersible system (CSS) or craft. Conventional and nuclear powered naval submarines, and diving bells are not addressed in this document.

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 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/

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3.1
breathing gas supply system
equipment providing breathing gas to the crewed compartment(s) while the submersible is surfaced or submerged

3.2
launch and recovery system
LARS
system supporting launch, recovery and other handling operations of a submersible

[SOURCE: ISO 5411:2024, 3.8.5, modified — note 1 to entry has been deleted.]

3.3
launch and recovery procedure
procedures by which the submersible is normally launched and recovered using the launch and recovery equipment

3.4
life support system
equipment and systems required to maintain a *crewed submersible system* (3.5) in a habitable condition in all anticipated operating conditions

3.5
crewed submersible system
CSS
vessel and supporting ancillary equipment that is used to carry personnel, *passengers* (3.6) or both, while operating underwater, submerging, surfacing and remaining afloat with the internal pressure of the crewed compartment normally maintained at or near one atmosphere

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