

Published in Norway: 2019-03-18

Language: English

Petroleum related manned underwater operations inshore

Petroleumsrelaterte bemannede
undervannsoperasjoner inshore

ICS: 75.180.01, 913.15

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Foreword

This NORSOK U-103:2019 was adopted as NORSOK Standard 2019-03-18.

NORSOK U-103:2019 Ed. 4 supersedes NORSOK U-103 Ed. 3, January 2014.

NORSOK is an acronym for the competitive position of the Norwegian continental shelf and comprise petroleum industry standards in Norway. The collaboration initiative in 1993 between the authorities and the petroleum industry initiated the development of NORSOK standards.

Reducing the project execution time and developing and operating cost for petroleum installations on the Norwegian shelf was the target.

The intention for the Petroleum industry is to develop and use standards providing good technical and cost-effective solutions to ensure that the petroleum resources are exploited and managed in the best possible way by the industry and the authorities. The industry will actively contribute to the development and use of international standards in the global market.

The NORSOK standards shall:

- bridge the gap based on experiences from the Norwegian continental shelf where the international standards are unsatisfactorily;
- replace oil company specifications where possible;
- be available as references for the authorities' regulations;
- be cost effective; and
- promote the Norwegian sector as an attractive area for investments and activities.

Developing new NORSOK standards and regular maintenance of existing standards shall contribute to maintain the competitiveness both nationally and internationally for the Norwegian petroleum industry.

The NORSOK standards are developed by experts from the Norwegian petroleum industry and approved according to the consensus principles as laid down by the guidelines given in NORSOK A-001N directive.

The NORSOK standards are owned by the Norwegian Oil and Gas Association, the Federation of Norwegian Industries and the Norwegian Shipowners' Association. They are managed and published by Standards Norway.

Annex B is normative. Annex A and C are informative.

Revision information

Major changes from edition 3 to 4 are listed below.

Removed:

- Former Annex C and corresponding definitions of helmets etc., has been removed.
- TUP
- Exception for treatment chamber in alternative location (former clause 7)

Edited:

- 2.1 Normative references list has been evaluated and revised.
- 2.2 Informative reference list has been replaced with Bibliography (after last annex).
- 3.10 “Underwater worker” is called “diver”
- 3.11 definition of “diving basket” harmonized with U-100
- 3.19 diving winch – text edited
- 3.36 stand-by diver – text edited
- 3.38 verification – text edited
- 6.2 Responsible Competent Diving Doctor (RCDD) term used for earlier “diving doctor”
- 7.3.7 Diving assistant – text edited
- 7.3.10 Minimum crew – text edited
- Most of clause 8 is harmonized with U-100
- 8.6.5 «Marking» is harmonized with U-100
- 8.3 Handling systems (LARS) – text edited/modified
- 8.6.4 Dimensions of hyperbaric chamber gas storage (when used for treatment) – heading modified
- 8.8 Breathing apparatus – text edited and modified
- 8.9 Diver umbilical - text edited and modified
- 8.10 Tools – heading modified
- 8.11 Diving platform/vessel – heading modified
- 9.3.2 Surface oriented diving. First clause under table 1 – text edited
- 9.3.3. Saturation diving/closed bell diving. Text edited
- 9.4 Monitoring. Clause now harmonized with U-100 and text edited
- 9.6 Communication. Third subclause – texts edited - storing of coms for 48 h
- 10 (former 9) Emergency preparedness requirements. Sub clause 1-3 and 5– text edited

Edited and moved:

- 9.1 Responsibilities. All former clauses under earlier “General” is moved or deleted

New and added text:

- 1. Scope – added Ref to NORSOK U100 for use of closed diving bell and or saturation diving
- 3. Terms, definitions clause is now harmonized with U-100
- 4 Abbreviations is a new clause
- 6.2 Responsible Competent Diving Doctor (RCDD) – updated
- 7.3.8 Responsible Competent Diving Doctor - competency added
- 7.3.9 Diving duty doctor – competency added
- Most of clause 8 is now edited and harmonised with U-100
- 5.2 Safety - included and harmonized in line with U-100
- Definitions of diving/closed, wet bell
- 8.1.2 Implementing new technology – new clause and text
- 8.1.3 Electricity, new clause and text
- 8.2 Dimensions and lay-outs, new clauses added
- 8.3 Handling system (LARS) b) new depth limit added
- 8.4 Self-propelled hyperbaric lifeboat (SPHL) new clause
- 8.5 Life support package – new clause

- 8.6 Gas supply - new clauses and edited text
- 8.7 Thermal balance – new clause and text
- 8.8 Breathing apparatus – new clause and edited text
- 8.13 Communication – new clause
- 8.14 Fire protection – new clause and text
- 8.15 Remotely operated vehicle used in conjunction with diving – new clause
- 8.16 Potable water supply
- 8.17 Maintenance - new text added
- 9.1 Responsibilities – new heading and text
- 9.1.2 Personnel subjected to hyperbaric conditions (include logbooks)
- 9.3.1 SCUBA diving – new text
- 9.4.3 Visual monitoring – new text
- 9.5 Operational measures – new text
- 10 Emergency preparedness requirement subclause 4 – text changed
- Annex A Weekly Report – new columns added to report for max depth, repeated dive
- Annex C Surface Oriented Diving Supervisors inshore – title edited

Introduction

This NORSOK standard is the result of an industry-wide effort to establish a standard for inshore petroleum related MUOs.

This NORSOK standard has been produced to establish a single common standard for inshore petroleum related diving operations. Users of this standard will typically be Companies involved in or supporting the oil and gas production, and the renewable energy industry. Relevant information and requirements included in this standard may also be used for other services which have similarities to the inshore petroleum related diving operations and the way this is operated.

This NORSOK standard has focus on typical requirements, deliveries and documentation expected between Companies and Contractors.

The bibliography lists standards, norms, laws, regulations and other literature that may be relevant to the use of this document.

Normative text contains the requirements of the standard. Informative text is only guidance to the reader. All text in foreword, introduction and notes is informative text. Note to entries in clause 3 and annexes to the document may be either normative or informative.

Petroleum related manned underwater operations inshore

1 Scope

This NORSOK standard defines basic requirements for personnel, equipment and systems for petroleum-related MUO (inclusive caisson as applicable) work inshore. For the use of closed (diving) bell and/or saturation diving, references are made to NORSOK U-100.

2 Normative references

The following referenced documents contain text which fully or in part is part of the requirements in the document. For dated references, only the edition cited applies. For undated references, the latest edition of the cited document applies (including amendments).

ISO 6385, *Ergonomic principles in the design of work systems*

ISO 8995-1, *Lighting of work places — Part 1: Indoor*

ISO 15001, *Anaesthetic and respiratory equipment — Compatibility with oxygen*

EN 689, *Workplace atmospheres — Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy*

EN 1089-3, *Transportable gas cylinders. Gas cylinder identification (excluding LPG). Colour coding*

EN 15333-1, *Respiratory equipment — Open-circuit umbilical supplied compressed gas diving apparatus — Part 1: Demand apparatus*

EN 15333-2, *Respiratory equipment — Open-circuit umbilical supplied compressed gas diving apparatus — Part 2: Free flow apparatus*

NS-EN 12021, *Respiratory equipment — Compressed gases for breathing apparatus*

NORSOK S-006, *HSE-evaluation of contractors*

NORSOK U-100, *Manned underwater operations*

NORSOK U-101, *Diving respiratory equipment*

NORSOK U-102, *ROV Services*

DNVGL OS-E402, *Offshore standards — Diving systems*

3 Terms and definitions

In this document, the following terms and definitions apply.

3.1

shall (requirement)

expression in the content of a document conveying objectively verifiable criteria to be fulfilled and from which no deviation is permitted if compliance with the document is to be claimed

Note 1 to entry: Requirements are expressed using the verbal forms specified in ISO/IEC Directives, Part 2 clause 7.2 Table 3.

3.2

should (recommendation)

expression in the content of a document conveying a suggested possible choice or course of action deemed to be particularly suitable without necessarily mentioning or excluding others

Note 1 to entry: Recommendations are expressed using the verbal forms specified in ISO/IEC Directives, Part 2 clause 7.3 Table 4.

Note 2 to entry: In the negative form, a recommendation is the expression that a suggested possible choice or course of action is not preferred but it is not prohibited.

3.3

may (permission)

expression in the content of a document conveying consent or liberty (or opportunity) to do something

Note 1 to entry: Permissions are expressed using the verbal forms specified in ISO/IEC Directives Part 2 clause 7.4 Table 5.

3.4

can (possibility and capability)

1: expression in the content of a document conveying expected or conceivable material, physical or causal outcome

2: expression in the content of a document conveying the ability, fitness, or quality necessary to do or achieve a specified thing

Note 1 to entry: Possibility and capability is expressed using the verbal forms specified in ISO/IEC Directives, Part 2 clause 7.5 Table 6.

3.5

accident

unwanted event which causes personal injury, environmental/material damage or loss of production

3.6

bail-out

auxiliary (secondary) and independent breathing gas supply or BA for use in case of a failure of the umbilical supply, to enable the diver to reach a place of safety where more breathing gas is available, such as the surface or a diving bell

3.7

caisson work

work operations where personnel are exposed to changes in ambient pressure, e.g. tunnel workers passing from one atmosphere to another

3.8**competent person**

person with authorisation/documentated qualifications for performing a specified function

3.9**dive spread**

A plant and/or asset supporting a MUO

3.10**diver**

person holding a diving certificate and a valid medical certificate issued by an approved authority or by institutions/organizations accredited by an approved authority

3.11**diving basket**

device used to lower and recover divers to and from workplaces under water, which do not protect against contact with surrounding water

Note 1 to entry: If the term "basket" is used alone, it is to be understood as "diving basket", unless the context clearly indicates otherwise

3.12**diving bell**

submersible compression chamber designed for transport of personnel between the surface and the workplace at atmospheric pressure or under increased pressure

Note 1 to entry: Synonymous with the term "closed bell" and not with "wet bell". If the term "bell" is used alone, it is to be understood as "diving/closed bell", unless the context clearly indicates otherwise

3.13**diving contractor**

diving company or firm undertaking MUO

3.14**diving depth**

the diver's actual water depth

3.15**diving operation**

activity where the diver is directly exposed to increased ambient pressure

3.16**diving platform**

installation from which the diving is performed

Note 1 to entry: May also be referred to as diving vessel

3.17**diving superintendent**

person who is qualified and has been appointed in writing by the diving contractor to be the person in charge of, and responsible for, a MUO

3.18**diving supervisor**

person who has been appointed in writing by the diving contractor to be in charge of a MUO or parts of such operation

3.19

launch and recovery system

LARS

appliance used to transport diver(s) between the sea and the diving platform, as well as to stabilise diver(s) during in-water decompression

Note 1 to entry: The diving LARS will normally consist of the following elements: diving basket, crane/lift unit, fastenings, wires, chain etc., and will be certified as one unit

3.20

duty diving doctor

medical doctor, approved as duty diving doctor, who is on call during diving operations

3.21

equivalent air depth

EAD

depth at which air would provide the same nitrogen partial pressure as the actual nitrox mix at a given depth

3.22

gas source

can be either gas storage or compressor

3.23

gas storage

container for storage of gas under pressure (gas bank)

3.24

gas supply

(part of) system/installation for distribution of gas from gas source to consumption point or equivalent to gas source

3.25

incident

generic term covering any undesired event

3.26

inshore MUO

MUO carried out inside territorial waters (normally within 12 n miles or 19,25 km from shore), including docks, harbours, canals, culverts, rivers, estuaries, lakes, reservoirs, dams, flooded tunnels, and tanks

3.27

light diving craft

LDC

small boat equipped as a complete dive station and operating from a mother vessel

3.28

manned underwater operation

MUO

activity when humans stay below surface and/or are exposed to increased ambient pressure

Note 1 to entry: Includes "diving operation"

3.29

meter of sea water

msw

pressure unit equal to 10 kPa (making 10 msw exactly 1 bar or 100 kPa), implies a relative density of 1.01972