SLOVENSKI STANDARD
oSIST prEN ISO 19906:2017

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Industrija nafte in zemeljskega plina - Naftne ploščadi za arktična območja (ISO/DIS 19906:2017)

Petroleum and natural gas industries - Arctic offshore structures (ISO/DIS 19906:2017)

Erdöl- und Erdgasindustrie - Offshore-Bauwerke für den Arktis-Bereich (ISO/DIS 19906:2017)

Industries du pétrole et du gaz naturel - Structures arctiques en mer (ISO/DIS 19906)

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75.180.10	Oprema za raziskovanje, vrtanje in odkopavanje	Exploratory, drilling and extraction equipment

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Petroleum and natural gas industries — Arctic offshore structures

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 19906 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 7, *Offshore structures*.

This second/third/... edition cancels and replaces the first/second/... edition (ISO 19901-2:2004), [clause(s) / subclause(s) / table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

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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).

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

For an explanation on 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 WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 7, *Offshore structures.*

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This second edition cancels and replaces the first edition (ISO 19906:2010), which has been technically revised.

ISO 19906 is one of a series of documents for offshore structures. The full series consists of the following documents.

— ISO 19900, Petroleum and natural gas industries — General requirements for offshore structures

— ISO 19901 (all parts), Petroleum and natural gas industries — Specific requirements for offshore structures

— ISO 19902, Petroleum and natural gas industries — Fixed steel offshore structures

— ISO 19903, Petroleum and natural gas industries — Fixed concrete offshore structures

— ISO 19904-1, Petroleum and natural gas industries — Floating offshore structures — Part 1: Monohulls, semi-submersibles and spars

— ISO 19905 (all parts), Petroleum and natural gas industries — Site-specific assessment of mobile offshore units

— ISO 19906, Petroleum and natural gas industries — Arctic offshore structures

Introduction

The series of documents ISO 19900 to ISO 19906 addresses design requirements and assessments for all offshore structures used by the petroleum and natural gas industries worldwide. Through their application, the intention is to achieve reliability levels appropriate for manned and unmanned offshore structures, regardless of the type of structure and the nature or combination of the materials used.

It is important to recognize that structural integrity is an overall concept comprising models for describing actions, structural analyses, design rules, safety elements, workmanship, quality control procedures and national requirements, all of which are mutually dependent. The modification of one aspect of design in isolation can disturb the balance of reliability inherent in the overall concept or structural system. The implications involved in modifications, therefore, need to be considered in relation to the overall reliability of all offshore structural systems.

The series of documents applicable to the various types of offshore structure is intended to provide wide latitude in the choice of structural configurations, materials and techniques without hindering innovation. Sound engineering judgment is, therefore, necessary in the use of these documents.

This document was developed in response to the offshore industry's demand for a coherent and consistent definition of methodologies to design, analyse and assess arctic and cold region offshore structures within the scope of Clause 1.

Structures capable of resisting ice have been in use in temperate regions for well over a century. These include bridge piers and navigation aids in ice-covered rivers and estuaries. In fact, bridge codes in cold countries have included methods for addressing ice loads dating back many decades. In more severe arctic and cold regions, ice-resistant structures are more recent. But much experience has been gained commencing in the 1960s, and this knowledge is incorporated into this document. Where uncertainties still exist, conservative approaches and methods have been recommended.

This document also addresses issues, such as topsides winterization, and escape, evacuation and rescue, that go beyond what is strictly necessary for the design, construction, transportation, installation and decommissioning of the structure. These issues are essential for offshore operations in arctic and cold region conditions and they are not covered in other documents. When future editions of ISO 19906 and other documents are prepared, efforts will be made to avoid duplication of scope.

Annex A provides background to and guidance on the use of this document and it is intended that it be read in conjunction with the main body of this document. The clause numbering in Annex A follows the numbering in the normative text to facilitate cross-referencing.

Annex B provides regional information on the physical environment of specific offshore areas in arctic and cold regions.

Some symbols in this document are not in accordance with the system of quantities on which the International System of Units is based, due to the need to conform with current ice literature. This might change in future editions of this document.

To meet certain needs of industry for linking software to specific elements in this document, a special clause-based numbering system has been permitted for figures, tables and formulae.

Petroleum and natural gas industries — Arctic offshore structures

1 Scope

This document specifies requirements and provides recommendations and guidance for the design, construction, transportation, installation and decommissioning of offshore structures related to the activities of the petroleum and natural gas industries in arctic and cold regions. Reference to arctic and cold regions in this document is deemed to include both the Arctic and other locations characterized by low ambient temperatures and the presence or possibility of sea ice, icebergs, icing conditions, persistent snow cover, and/or permafrost.

The objective of this document is to ensure that complete structures, including substructures, topsides structures, floating production vessel hulls, foundations and mooring systems, in arctic and cold regions provide an appropriate level of reliability with respect to personnel safety, environmental protection and asset value. Value includes value to the owner, to the industry and to society in general.

This document does not contain requirements for the operation, maintenance, service-life inspection or repair of arctic and cold region offshore structures, unless the design strategy imposes specific requirements such as ice management to reduce ice actions.

While this document does not apply specifically to mobile offshore drilling units (see ISO 19905-1), the procedures relating to ice actions and ice management contained herein are applicable to the assessment of such units.

This document does not apply to mechanical, process and electrical equipment or any specialized process equipment associated with arctic and cold region offshore operations except in so far as it is necessary for the structure to sustain safely the actions imposed by the installation, housing and operation of such equipment.

2 Normative references

The following referenced documents are indispensable for the application 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 17776, *Petroleum and natural gas industries — Offshore production installations — Guidelines on tools and techniques for hazard identification and risk assessment*

ISO 19900:2013, *Petroleum and natural gas industries — General requirements for offshore structures*

ISO 19901-1, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 1: Metocean design and operating considerations*

ISO 19901-2, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 2: Seismic design procedures and criteria*

ISO 19901-3, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 3: Topsides structure*

ISO 19901-4, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 4: Geotechnical and foundation design considerations*

ISO 19901-6, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 6: Marine operations*

ISO 19901-7, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 7: Stationkeeping systems for floating offshore structures and mobile offshore units*

ISO 19901-8, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 8: Marine soil investigations*

ISO 19902, *Petroleum and natural gas industries — Fixed steel offshore structures*

ISO 19903, *Petroleum and natural gas industries — Fixed concrete offshore structures*

ISO 19904-1, *Petroleum and natural gas industries — Floating offshore structures — Part 1: Monohulls, semi-submersibles and spars*

ISO 35101, *Petroleum and natural gas industries — Arctic operations — Working environment*

ISO 35102, *Petroleum and natural gas industries — Arctic operations — Escape, evacuation and rescue from offshore installations*

ISO 35104, *Petroleum and natural gas industries — Arctic operations — Ice management*

ISO 35106, *Petroleum and natural gas industries — Arctic operations — Arctic metocean, ice, and seabed data*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19900:2013, ISO 19901-1, ISO 19901-2, ISO 19901-4, ISO 35102, ISO 35104, ISO 35106 and the following apply.

3.1
abrasion
effect of ice grinding against the surface of a structure thus removing paint, surface protrusions and coatings, oxidized material, or concrete particles and aggregate

3.2
action combination
expression in which design values of individual simultaneous actions for a design situation are summed to obtain the total design action for the verification of the reliability of a structure for a specific limit state

3.3
adfreeze
freezing of ice or soil onto the surface of a structure

3.4
aspect ratio
ratio of structure diameter or width to ice thickness

3.5
broken ice
ice pieces of varying size, broken up as a result of natural processes, or active or passive intervention

Note 1 to entry: Active intervention includes ice management resulting in managed ice; passive intervention includes the channel, or wake, caused by a stationary structure in moving ice cover.

3.6
companion environmental action
environmental action applied simultaneously with the principal environmental action

3.7
consolidation
process of freezing of pore water in voids within ice rubble or between floes

Note 1 to entry: For soils, consolidation involves drainage of pore fluid as a result of overburden pressures.

3.8
consolidated layer
portion of an ice ridge keel, rubble pile, rubble field or stamukha below the waterline formed by the ice consolidation process

3.9
design action
sum of design values of individual simultaneous actions for an action combination

3.10
design resistance
resistance limit calculated from factored representative values of basic variables, or from factored expressions based on unfactored representative values of basic variables

Note 1 to entry: Material properties are examples of basic variables relevant to resistance.

3.11
disconnection
planned separation of the risers (and mooring, if applicable) from a floating structure

3.12
ductility
ability of a material to deform and absorb energy beyond its elastic limit or ability of a component to sustain action effects beyond yield

Note 1 to entry: See also *system ductility* (3.67).

3.13
dynamic action
action that induces acceleration of a structure or a structural component of a magnitude sufficient to require specific consideration

3.14
dynamic positioning
stationkeeping technique consisting primarily of a system of automatically controlled on-board thrusters, which generate appropriate thrust vectors to counter the mean and slowly varying induced actions

[SOURCE: ISO 19901-7:2013]

3.15
emergency disconnection
planned separation of the risers (and mooring, if applicable) from a floating structure, without depressurization of the risers

