



SLOVENSKI STANDARD
SIST EN ISO 19903:2007

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Prečiščena različica slovenskega standarda SIST EN ISO 19903:2007, ki je v skladu s slovenskim standardom SIST EN ISO 19903:2007.

Petroleum and natural gas industries - Fixed concrete offshore structures (ISO 19903:2006)

Erdöl- und Erdgasindustrie - Feststehende Offshore-Betonkonstruktionen (ISO 19903:2006)

Industries du pétrole et du gaz naturel - Structures en mer fixes en béton (ISO 19903:2006)

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ICS:

75.180.10	Oprema za raziskovanje in odkopavanje	Exploratory and extraction equipment
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ICS 75.180.10

English Version

Petroleum and natural gas industries - Fixed concrete offshore
structures (ISO 19903:2006)

Industries du pétrole et du gaz naturel - Structures en mer
fixes en béton (ISO 19903:2006)

Erdöl- und Erdgasindustrie - Feststehende Offshore-
Betonkonstruktionen (ISO 19903:2006)

This European Standard was approved by CEN on 25 November 2006.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN ISO 19903:2006) has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum and natural gas industries" in collaboration with Technical Committee CEN/TC 12 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2007, and conflicting national standards shall be withdrawn at the latest by June 2007.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of ISO 19903:2006 has been approved by CEN as EN ISO 19903:2006 without any modifications.

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**Petroleum and natural gas industries —
Fixed concrete offshore structures**

*Industries du pétrole et du gaz naturel — Structures en mer fixes en
béton*

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Contents

Page

Foreword.....	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Symbols and abbreviated terms	8
4.1 Symbols	8
4.2 Abbreviated terms	10
5 General requirements	11
5.1 General	11
5.2 National requirements	11
5.3 Overall planning requirements	11
5.4 Functional requirements	12
5.5 Structural requirements	13
5.6 Design requirements	14
6 Actions and action effects	16
6.1 General	16
6.2 Environmental actions	17
6.3 Other actions	22
6.4 Partial factors for actions	27
6.5 Combinations of actions	28
6.6 Exposure levels	30
7 Structural analysis	31
7.1 General	31
7.2 General principles	31
7.3 Physical representation	34
7.4 Types of analyses	38
7.5 Analyses requirements	41
8 Concrete works	46
8.1 General	46
8.2 Design	48
8.3 Materials	51
8.4 Execution	57
8.5 Geometrical tolerances	70
8.6 Quality control — Inspection, testing and corrected actions	73
9 Foundation design	77
9.1 Introduction	77
9.2 General	77
9.3 Soil investigation	78
9.4 Representative soil properties	78
9.5 Partial factors for actions and materials	78
9.6 Geotechnical design principles	79
9.7 Bearing and sliding stability	80
9.8 Soil reactions on structures	81
9.9 Installation and removal	81
9.10 Scour	82
10 Mechanical systems	82

10.1	Introduction	82
10.2	Permanent mechanical systems.....	83
10.3	Mechanical systems — Temporary	90
10.4	Attachments and penetrations	93
10.5	Mechanical systems — Special considerations	94
11	Marine operations and construction afloat	95
11.1	General	95
11.2	Engineering and planning	96
12	Corrosion control.....	96
12.1	Introduction	96
12.2	Design for corrosion control.....	98
12.3	Fabrication and installation of systems for corrosion control.....	102
13	Topsides interface design.....	103
13.1	Introduction	103
13.2	Basis for design	104
13.3	Deck/shaft structural connection	104
13.4	Topsides — Structure mating	105
13.5	Transportation, tow-to-field	105
14	Inspection and condition monitoring.....	105
14.1	General	105
14.2	Objective	105
14.3	Personnel qualifications.....	106
14.4	Planning	106
14.5	Documentation	107
14.6	Important items related to inspection and condition monitoring	108
14.7	Inspection and condition monitoring types	111
14.8	Marking.....	112
14.9	Guidance for inspection of special areas.....	112
15	Assessment of existing structures	115
15.1	General	115
15.2	Structural assessment initiators	116
Annex A (informative) Regional information		117
Bibliography		119

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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 19903 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*.

ISO 19903 is one of a series of standards for offshore structures. The full series consists of the following International Standards.

- STANDARD PREVIEW**
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- 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*¹⁾
 - 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 19904-2, *Petroleum and natural gas industries — Floating offshore structures — Part 2: Tension leg platforms*²⁾
 - ISO 19905-1, *Petroleum and natural gas industries — Site-specific assessment of mobile offshore units — Part 1: Jack-ups*²⁾
 - ISO/TR 19905-2, *Petroleum and natural gas industries — Site-specific assessment of mobile offshore units — Part 2: Jack-ups commentary*²⁾
 - ISO 19906, *Petroleum and natural gas industries — Arctic offshore structures*²⁾

1) To be published.

2) Under preparation.

Introduction

The series of International Standards applicable to offshore structures, ISO 19900 to ISO 19906, constitutes a common basis covering those aspects that address design requirements and assessments of 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, whatever the type of structure and 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 International Standards 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 judgement is therefore necessary in the use of these International Standards.

International Standard ISO 19903 was developed based on experience gained from the design, execution and use of a number of fixed concrete platforms, in particular from more than 30 years of experience with such structures in the North Sea. The background documents when developing this International Standard are from the following types of documents:

- national regulations and other requirements from the authorities;
- regional standards; <https://standards.iteh.ai/catalog/standards/sist/6b86619e-f61a-44f4-80bd-a31fd67af7fd/sist-en-iso-19903-2007>
- national standards;
- operator's company specifications;
- scientific papers and reports;
- reports from inspection of structures in use.

This International Standard draws on the experience gained with fixed concrete offshore structures. This experience shows that fixed concrete offshore structures perform well and are durable in the marine environment. These structures are all unique, one-of-a-kind structures, purpose-made for a particular location and a particular set of operating requirements. This is reflected in ISO 19903 by the fact that the standard gives guidance rather than detailed prescriptive rules. This International Standard reflects in particular the experience and the conditions in the North Sea and the east coast of Canada, and the design rules and practices used there, but is intended for worldwide application.

Petroleum and natural gas industries — Fixed concrete offshore structures

1 Scope

This International Standard specifies requirements and provides recommendations applicable to fixed concrete offshore structures for the petroleum and natural gas industries, and specifically addresses

- a) the design, construction, transportation and installation of new structures, including requirements for in-service inspection and possible removal of structures,
- b) the assessment of structures in service, and
- c) the assessment of structures for reuse at other locations.

This International Standard is intended to cover the engineering processes needed for the major engineering disciplines to establish a facility for offshore operation. It can also be used for the design of floating concrete structures as specified in ISO 19904-1 [11] (and the future ISO 19904-2 [12] when published) and for arctic structures (as specified in the future ISO 19906 [7] when published).

In order to provide a standard that will be useful to the industry, a comprehensive treatment of some topics is provided where there is currently no relevant reference. For such well-known topics as the design formulas for concrete structural members, this International Standard is intended to be used in conjunction with a suitable reference standard for basic concrete design (see 8.2.1). The designer can use suitable national or regional design standards that provide the required level of safety. Only other ISO documents will be referenced directly in the text.

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 1920-3, *Testing of concrete — Part 3: Making and curing test specimens*

ISO 1920-4, *Testing of concrete — Part 4: Strength of hardened concrete*

ISO 2394, *General principles on reliability for structures*

ISO 4463-1, *Measurement methods for building — Setting-out and measurement — Part 1: Planning and organization, measuring procedures, acceptance criteria*

ISO 6934 (all parts), *Steel for the prestressing of concrete*

ISO 6935 (all parts), *Steel for the reinforcement of concrete*

ISO 19900, *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 19903:2006(E)

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

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

ISO 19901-5, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 5: Weight control during engineering and construction*

ISO 19901-6, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 6: Marine operations*³⁾

ISO 19902, *Petroleum and natural gas industries — Fixed steel offshore structures* ³⁾

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19900 and the following apply.

NOTE Terms and definitions relevant for the use of this International Standard are also found in ISO 19901-1, ISO 19901-2, ISO 19901-4 and ISO 19901-6 and in ISO 19902.

3.1 abnormal design situation
design situation in which conditions exceed conventionally specified design conditions and which is used to mitigate against very remote events

NOTE Abnormal design situations are used to provide robustness against events with a probability of typically 10^{-4} per annum or lower by avoiding, for example, gross overloading.

[ISO 19901-2] <https://standards.iteh.ai/catalog/standards/sist/6b86619e-f61a-44f4-80bd-a31fd67af7fd/sist-en-iso-19903-2007>

3.2 abnormal level earthquake
ALE
intense earthquake of abnormal severity under the action of which the structure should not suffer complete loss of integrity

NOTE The ALE event is comparable to the abnormal event in the design of fixed structures which are described in ISO 19902 and ISO 19903. When exposed to the ALE, a manned structure is supposed to maintain structural and/or floatation integrity for a sufficient period of time to enable evacuation to take place.

[ISO 19901-2]

3.3 accidental design situation
design situation involving exceptional conditions of the structure or its exposure

EXAMPLE Impact, fire, explosion, local failure or loss of intended differential pressure (e.g. buoyancy).

3.4 action
external load applied to the structure (direct action) or an imposed deformation or acceleration (indirect action)

NOTE 1 An imposed deformation can be caused by fabrication tolerances, settlement, temperature change or moisture variation.

3) To be published.

NOTE 2 An earthquake typically generates imposed accelerations.

[ISO 19900]

3.5

action effect

effect of action on structural components

EXAMPLE Internal force, moment, stress or strain.

[ISO 19900]

3.6

addition

finely divided material used in concrete in order to improve certain properties or to achieve special properties

NOTE This International Standard deals with two types of inorganic additions:

- nearly inert additions (type I);
- pozzolanic or latent hydraulic additions (type II).

3.7

admixture

material added during the mixing process of concrete in small quantities related to the mass of cement to modify the properties of fresh or hardened concrete

3.8

after-damage design situation

design situation for which the condition of the structure reflects damage due to an accidental design situation and for which the environmental conditions are specially defined

3.9

aggregate

granular mineral material suitable for use in concrete

NOTE Aggregate can be natural, artificial or recycled from material previously used in construction.

3.10

air cushion

air pumped into underbase compartments of the structure

NOTE Normally applied in order to reduce the draft and increase the freeboard of the structure and/or to alter the structural loading.

3.11

atmospheric zone

part of the load-bearing structure that is above the splash zone

3.12

caisson

major portion of fixed concrete offshore structure, providing buoyancy during floating phases and the possibility of oil storage within the structure

NOTE The caisson is generally divided into watertight compartments, which can be subdivided into intercommunicating cells for structural reasons. The caisson can also be filled, or partly filled, with ballast water and solid ballast.

3.13
characteristic value of a material property

value of a material or product property having a prescribed probability of not being attained in a hypothetical unlimited test series, a nominal value being used as the characteristic value in some circumstances

NOTE The characteristic material property generally corresponds to a specified fractile of the assumed statistical distribution of the particular property of the material or product. Characteristic strength is normally defined as the value of the strength below which 5 % of the population of all possible strength determinations of the material under consideration are expected to fall or, alternatively, 95 % if an upper value is more severe.

3.14
critical shear zone

zone in which the shear stress is at a maximum in relation to the shear strength

3.15
concrete

material formed by mixing cement, coarse and fine aggregate and water, with or without the incorporation of admixtures and additions, which develops its properties by hydration of the cement

3.16
condition monitoring

evaluation of the condition and behaviour of the load-bearing structure(s) in service using data from design, inspection and instrumentation

3.17
construction afloat

fabrication, construction and related activities taking place on a structure that is afloat, normally at an inshore location and restrained by a temporary mooring system

3.18
deck mating

marine operation in which the platform topsides is floated into position and connected to the substructure

NOTE This operation is normally conducted by ballasting and deballasting of the substructure.

3.19
deep water construction site

site for construction of the structure while afloat

NOTE The use of a deep water site might not always be required, depending on the construction method. It might or might not be the same location as that where mating of topsides to the substructure takes place.

3.20
design rules

rules in accordance with the chosen reference standard for concrete design

NOTE See 8.2.

3.21
dynamic amplification factor
DAF

ratio of a dynamic action effect to the corresponding static action effect

NOTE An appropriately selected dynamic amplification factor can be applied to static actions to simulate the effects of dynamic actions.

3.22
extreme level earthquake
ELE

earthquake with a severity which the structure should sustain without major damage

NOTE The ELE event is comparable to the extreme environmental event in the design of fixed structures which are described in ISO 19902 and ISO 19903. When exposed to an ELE, a structure is supposed to retain its full capacity for all subsequent conditions.

[ISO 19901-2]

3.23 execution

all activities carried out for the physical completion of the work including procurement, inspection and documentation thereof

NOTE The term covers work on site; it might also signify the fabrication of components off-site and their subsequent erection on site.

3.24 exposure level

classification system used to define the requirements for a structure based on consideration of life safety and of environmental and economic consequences of failure

NOTE The method for determining exposure levels is described in ISO 19902. An exposure level 1 platform is the most critical and exposure level 3 the least. A normally manned platform which cannot be reliably evacuated before a design event will be an exposure level 1 platform.

[ISO 19900]

3.25 finite element analysis FEA

analysis method whereby a structure or a part thereof is subdivided into small elements of known or assumed behaviour, then analysed by numerical matrix methods to determine action effects, static or dynamic

3.26 fixed concrete offshore structure FCS

concrete structure designed to rest on the sea floor

NOTE Sufficient structural stability can be achieved through its own weight, or in combination with suction in skirt compartments, or founding of the structure on piles into the seabed. It includes the mechanical outfitting of the structure.

3.27 fixed structure

structure that is bottom founded and transfers all actions on it to the seabed

[ISO 19900]

3.28 float-out

transfer of a major assembly from a dry construction site to a self-floating condition

NOTE Typically, it is the transfer of the lower part of the concrete structure from a flooded drydock.

3.29 global analysis

determination of a consistent set of either internal forces and moments or of stresses in a structure that are in equilibrium with a defined set of actions on the entire structure and which depend on geometrical, structural and material properties

NOTE For a global analysis of a transient situation (e.g. seismic), the internal response is part of the equilibrium.